

MAGAZINE

OF

ZOOLOGY AND BOTANY.

ORIGINAL COMMUNICATIONS.

I.—*On the Natural History and Relations of the Family of Cuculidæ or Cuckoos, with a view to determine the series of their variation.* By WILLIAM SWAINSON, F. R. & L. S. &c.

IN submitting to the scientific world the result of my investigations on this and all other natural groups of the Animal Kingdom, it is perhaps needless to premise that they have been conducted with the object of accumulating additional proofs of the validity of those views on the system of creation, the principles of which have been so amply detailed in the treatise “on the Classification of Animals,” and illustrated by examples in that upon quadrupeds. The ornithological volumes of the same series, now in the press, will enable the unprejudiced naturalist to determine the truth or fallacy of these views; and whether my original propositions receive further confirmation in this most attractive department of nature. It is nevertheless impossible, upon a subject so vast, to enter into those minute details, in every instance, relative to each family, which should alone satisfy the philosophic inquirer: especially where the object of the treatises just alluded to is rather the condensation of results, than the detail of those facts upon which these results are grounded. Some few of the groups of ornithology have been analyzed in the *Fauna Boreali-Americana*, or Northern Zoology, and others will be laid before the public, for the first time, in the series above alluded to; but the limited extent of two volumes, to which the ornithological treatise is restricted, will oblige me to confine the elucidation of the greater portion of the families to a narrow compass. It is, therefore, with a view of supplying the

necessary data for testing the soundness of the results there given, that I propose, in this publication, to treat of such groups more at large, rather wishing to lay before the experienced ornithologist the reasons upon which my opinions are grounded, than to have it supposed I wish those opinions to be received upon trust, without the production and evidence of facts.

I believe there cannot be the slightest doubt that the family of the *Cuculidæ* or Cuckoos, is the most aberrant family of the scansorial tribe. This conclusion may be arrived at by two ways, *first*, by considering the natural habits and structure of the birds themselves; and *secondly*, by ascertaining the relations of affinity which they bear to other groups, wherein the scansorial power is more developed. The first line of inquiry should always take precedence of the second; because, without understanding the history and structure of a bird, it is impossible to associate it with its natural companions. A rapid survey, therefore, of the chief peculiarities of the group before us, may precede a more minute inquiry into its contents.

The Cuckoos are altogether natives of such climates as lie beyond the influence of frost, and their number seems to be regulated by the proximity of their native country to the equator. Thus the ornithology of Europe presents us with only two species, both of which, during the summer, take up a temporary residence in latitudes otherwise cold, but which they hastily quit at the approach of autumn; and so congenial is warmth to their nature, that even the mild temperature of an Italian winter is not sufficient to retard their return to the sultry groves of Northern Africa. There is a fact regarding their structure, which appears connected with this susceptibility of cold, and which I believe has not hitherto been noticed. All the Cuckoos, both of the old and the new world, which I have had the opportunity of dissecting, are remarkable for the thinness and delicacy of their skins, so much so, indeed, as to render their preservation in an entire state, extremely difficult to inexperienced hands. Every one who has skinned the common British species must doubtless have observed this. On the other hand, as if to compensate for this delicacy of the cuticle, the feathers, more especially upon the back and rump, are unusually thick set and compact. Nor is this peculiarity of organization confined to the family before us, for we find La Vaillant observing the very same thing in respect to the *Ceblepyrinæ* of Africa, and nearly the whole family of pigeons have very thin skins, and thick set feathers. Nor are these relations of analogy without method, for on comparing the circles in which the *Cuculidæ*, the *Ceblepyrinæ*, and the *Colum-*

bidæ are respectively placed, it will be found that they mutually represent each other ; all being tenuirostral types.

But after all, it is more than probable that the birds now before us are restricted to warm latitudes by the nature of their food, and not from any peculiar impatience of cold, arising from the above circumstances. The *Cuculidæ* are insectivorous and frugivorous, for they live both upon insects and fruits ; the former habit, however, is not manifested by those bristles which are usually seen at the mouth of insect-eating birds, because the cuckoos only devour soft caterpillars ; but the latter is manifested by their wide gape, the angle of the mouth being carried far backwards towards or even under the eye : this structure enables the jaws, or mandibles, to be very widely extended, and is a certain indication that such birds feed upon soft fruits, which are swallowed whole. From all this it is clear that the cuckoos, independent of other considerations, can only exist, permanently or temporarily, in warm countries, where insects and fruits abound ; and we accordingly find that their geographic distribution has been so regulated.

So faintly is the scansorial structure indicated in these birds, that but for their natural habits, joined to the position of their toes, we should not suspect they were so intimately connected with the more typical groups of the tribe, as they undoubtedly are. They neither use their bill for climbing like the parrots, or for making holes in trees, like the woodpeckers, neither can they mount the perpendicular stems, like the *Certhiadæ* or creepers : and yet they decidedly climb, although in a manner peculiar to themselves. Having frequently seen different species of the Brizilian cuckoos (forming part of the genus *Coccyzus*) in their native forests, I may safely affirm that they climb in all other directions than that of the perpendicular. Their flight is so feeble, from the extreme shortness of their wings, that it is evidently performed with difficulty, and it is never exercised but to convey them from one tree to another, and these flights in the thickly wooded tracts of tropical America are of course very short : they alight upon the highest boughs, and immediately begin to explore the horizontal and slanting ramifications, with the greatest assiduity, threading the most tangled mazes, and leaving none unexamined. All soft insects inhabiting such situations laying in their route become their prey ; and the quantities that are thus destroyed must be very great. In passing from one bough to another, they simply hop, without using their wings, and their motions are so quick that an unpractised observer, even if placed immediately beneath the tree, would soon lose sight of the bird. The Brazilian hunters give to their cuckoos the general name

of *cats-tail*; nor is the epithet inappropriate, for their long hanging tails, no less than their mode of climbing the branches, gives them some distant resemblance to that quadruped. I have no doubt that the great length of tail possessed by nearly all the cuckoos is given to them as a sort of balance, just as a rope-dancer, with such an instrument in his hands, preserves his footing when otherwise he would assuredly fall. Remote, therefore, as the cuckoos unquestionably are from the typical *Scansores*, we yet find the functions of the tail contributing to that office, although in a very different mode to that which it performs among the woodpeckers, the parrots, and the creepers.

The structure of the feet, as before observed, is the only circumstance which would lead an ornithologist to place these birds among the climbers, supposing he was entirely unacquainted with their natural history, properly so called, or with their close affinity to the more perfect *Scansores*. The toes, indeed, are placed in pairs; that is, two directed forward, and two apparently backward, but a closer inspection will show that the latter are not strictly posterior, and that they differ so very materially from those of the *Picidæ*, (the pre-eminently typical family of the climbers,) as clearly to indicate a different use. The organization of the external posterior toe of all the woodpeckers, parrots, and toucans, renders it incapable of being brought forward, even in the slightest degree; whereas, in the cuckoos this toe can be made to form a right angle with that which is next it in front, from which circumstance it has been termed *versatile*: this term, however, is not strictly correct, inasmuch as the toe cannot be brought more than half way *forward*, although it can be placed entirely *backward*. Now this form, which is obviously the least developed state of the scansorial structure, accords exactly with the rank of the family, which is that of the most aberrant group in the circle, and furthest removed from the type. The cuckoos, in fact, are half-perching, half-climbing birds, not only in their feet, but, as we have seen, in their manners. No one, from seeing them alive, would suppose they were truly scansorial birds: and yet it is highly probable that this singular power of varying the position of one of their toes, gives them that quickness of motion, and firmness of holding, which accompanies the habits just mentioned.

There is another circumstance in the history of this family of birds which, with one solitary exception,* is altogether peculiar, as they contain the only parasitic birds yet known. This term, indeed, has been applied,—I think improperly,—to other genera, which,

* *Molothrus pecoris*, see North. Zool. (the cow-bunting) of North America.

like the Frigate Pelicans, the jagars, and some of the eagles, rob other birds of their food ; but this is a mere act of thieving, for all these feathered robbers can, and do habitually depend just as much upon their own industry in procuring food. But with the typical cuckoos the case is far different, for by depositing their eggs in the nest of other birds, to whom they leave the care of hatching their young and feeding them afterwards, they become as truly parasitic as any of the *Acari* or *Pediculi* ; they fasten themselves, as it were, on another living animal, whose animal heat brings their young into life, whose food they alone live upon, and whose death would cause theirs, during the period of infancy. Such only is a parasitic animal, and such only, among birds, belong to the typical cuckoos, and their representative the *Molothrus pecoris*.

Such may be considered the leading or most typical distinctions of the family now before us, as furnished by that particular group which stands at the head, and of which our English species is a perfect example. As we descend more into detail, and investigate the peculiarities which distinguish the minor divisions, we shall find all those variations of structure and of economy which is to be met with in every other natural group of birds, following in the same uniform series as the primary types of the animal kingdom. Before, however, we proceed further, it will be satisfactory to show how perfectly the conclusion we have come to, on the aberrant rank of the family, is supported by the following table ; wherein the five families of the *Scansores* are arranged under the three primary divisions of the tribe.

ANALOGIES OF THE SCANSORES OR CLIMBERS.

	Families of the Scansores.	Typical characters.	Tribes of the Insesores.	Orders of Birds.
1. Sub-typical circle,	{ PSITTACIDÆ,	{ Bill short, with a distinct notch or tooth,	{ DENTIROSTRES.	{ RAPTORES.
2. Typical circle,	{ PICIDÆ,	{ Bill lengthened, conic, nostrils covered with incumbent feathers,	{ CONIROSTRES.	{ INSESORES.
3. Aberrant circle,	{ CERTHIADÆ,	{ Nostrils protected by a corneous scale,	{ SCANSORES.	{ RASORES.
	{ CUCULIDÆ,	{ Feet not strictly scansorial, very short, nostrils naked, tail covers remarkably long,	{ TENUIROSTRES.	{ GRALLATORES.
	{ RAMPHASTIDÆ	{ Feet syndactyle, head and jaws large,	{ FISSIROSTRES.	{ NATATORES.

We see in this table a precision and harmony which is not to be

found in any other yet published, for the rank of each group in the three columns is so preserved, that what is typical in one is also typical in the two others. Thus, for instance, the *Picidæ* or woodpeckers, which are the most perfect of all the climbers, are seen to represent the *Conirotres*, the most perfect of the perching order, and also the *Insessores*, which in like manner is the most perfect in the class of AVES. These analogies can be traced, in like manner, transversely, and arise as it were incidentally, without any derangement of the *perpendicular* series of affinities, by which the *Picidæ* follow the *Psittacidæ*, and these latter being succeeded by the creepers (*Certhiadæ*), the cuckoos (*Cuculidæ*), and the toucans (*Ramphastidæ*). The affinities, in short, as expressed in the above table, are perpendicular, and analogies transverse. As some of these latter are very curious, we shall here notice them. Every one must be struck with the intimate resemblance which the bill of the parrots has to that of the shrikes, among the *Dentirostres*, and to the hawks, among the *Raptores*,—a resemblance which led to the old artificial arrangements, wherein the two groups are made to follow each other. Quitting these, we have the conic lengthened bill of the woodpeckers, representing the *Conirotres* in one column, and the *Insessores* in the other. The creepers (*Certhiadæ*), as every one knows, are eminently scansorial birds, although they have three toes forward, and one backward,—like the *Rasores*,—and in both the tail is unusually developed, although in different ways. The *Cuculidæ*, as already demonstrated, are the most aberrant group of the whole, as this denomination implies that they are the most imperfect climbers. This latter conclusion, which we deduct theoretically from the situation we assign to this family, is borne out by the details already given. These birds, in fact, may be said rather to run than climb among the horizontal branches of trees, as the *Grallatores* are the swiftest runners on the ground; the cuckoos, moreover, have the very short feet of the *Tenuirostres*, and the very long tail-covers of the *Grallatores*. Lastly, the *Ramphastidæ* or toucans represent the natatorial type, the chief characteristics of which, as more fully explained elsewhere,* is great bulk, a large head, wide mouth, short tail, and imperfect feet: now all these peculiarities distinguish the toucans from the rest of the *Scansores*, and thus their analogy to the *Fissirostres* in the circle of the perchers, and to the *Natatores* in that of the orders of birds, is not only unequivocal, but most striking and remarkable.

I shall now point out in what manner I conceive these five sub-

* Classification of Animals.

divisions of the tribe unite among themselves, and form a circle of affinity, and I shall then endeavour to trace the same principle of circularity in such of the minor groups or sub-families as are most abundant in species.

Commencing with the *Picidæ* or woodpeckers, which are obviously the pre-eminent type of the scansorial birds, we see a gradual approximation towards the soft tail, the green, bright-coloured plumage, and the curved, toothed bill of the parrots in the barbuts (*Bucco*,) and the tooth-bills (*Pogonias*, L.) The first of these genera so much resemble the *Psittacidæ* in the style and similarity of their colouring that they might be taken for parrots, if their bills and feet did not evince an equal relation to the woodpeckers. The assertion of M. Temminck, that these birds do not climb,* is completely disproved by Mr Burchell, who assures me, from his personal observations, they have nearly the same scansorial habits as the *Picianæ*,—a fact confirmed, indeed, by the structure of their feet. Next to these we have the genus *Pogonias*, whose short, curved, and toothed bill brings us so close to the *Psittacidæ*, that one genus more would render the union of these families complete; although it is even now so obvious that no question can be raised on this point. Leaving the *Psittacidæ*, we enter among the toucans, by the green-coloured *Aracaris*, which have very properly been lately separated as a distinct group: these birds, in short, connect the toucans to the parrots in the same manner as *Pogonias* unites the parrots with the woodpeckers. It is thus we enter the family of the *Ramphastidæ* or toucans, the fissirostral division of the Scansores, where, as in all perfect fissirostral types, we have great bulk, a very large or wide mouth, and small syndactyle feet,—that is, with the toes more or less united. I may here advert to a fact in the economy of the toucans hitherto unpublished, and which gives an additional confirmation of their affinity to the *Psittacidæ*. Many, if not all, of the parrots, as it is well known, employ their hooked bill as an organ of prehension. My observations on the toucans of Brazil lead me to believe that they occasionally do the same, while climbing among the entangled foliage and branches in search of birds' nests, from which they greedily snatch either the eggs or the young. The Australian *Sythrops*, or channelbill, is a cuckoo, with the bill of a toucan; and thus we pass from one family to the other so gradually, that analysis alone can determine to which this singular genus belongs.

* M. Temminck gives no authority for this opinion, which must have been copied from other authors, he himself never having travelled out of Europe.

Saurothera follows Sythrops, and at once brings us among the genuine *Cuculidæ*.

All our best writers, without a solitary exception, have placed the honey-guides (*Indicator*) among the cuckoos, but by a singular oversight, they have overlooked the equally strong affinity which these remarkable birds possess to the African genus *Buphaga*; or at least having perceived some relation (as evinced by the name of *Indicator Buphagoides*) between the two, they have fancied it merely analogical. The analysis, however, of this tribe, has convinced me that the two genera actually follow each other, and this will appear more evident on a subsequent exposition of the family of *Certhiadae*, to which *Buphaga* directly introduces us. The short, robust bill of this latter genus is nearly preserved in the Australian *Orthonyx*, which, by means of the Brazilian genus *Sclerurus*, brings us at once among the typical *Certhiadae*. *Sitta*, in this latter family, leads immediately to *Oxyrhynchus* in that of the *Picidae*, the group, in fact, from whence we first began to trace the circle of the *Scansores*.

Having now sufficiently dwelt upon the station, in the circle of the scansorial birds, which the family under consideration appears to hold, we may at once proceed to the internal arrangement of the primary divisions of the family. Looking, therefore, to those genera which show the most prominent differences, I conceive that the whole are naturally arranged in the following divisions:

SUB-FAMILIES OF THE CUCULIDÆ.

<i>Sub-families.</i>	<i>Essential Characters.</i>	<i>Typical Genera.</i>
CUCULINÆ,	{ Wings long, more or less pointed, nostrils round,	{ CUCULUS, <i>Lin.</i>
COCCYZINÆ,	{ Wings short, more or less rounded; nostrils linear, base of the upper mandible dilated.	{ COCCYZUS, <i>Vieil.</i>
SAUROTHERINÆ,	{ Bill long, large, either serrated or hollow,	{ SAUROTHERA, <i>Vieil.</i>
OPISTHOCOMINÆ,...	Legs very long,.....	OPISTHOCOMUS? <i>Hoff.</i>
INDICATORINÆ,.....	Bill short, thick; tail somewhat rigid,...	INDICATOR, <i>Sparm.</i>

The aberrant genera, which represent the sub-families, are few; but they are sufficiently marked, as will subsequently appear, to point out their true rank and station. The two typical sub-families, on the other hand, are so diversified in their subordinate divisions or genera, that they may each be considered as perfect circles, thus adding another proof of the position so often verified, that typical groups are almost invariably more exuberant in species, and in modifications of form, than any others.

My first object will be to show in what manner these sub-fami-

lies are united, so as to form a circle ; or, in other words, to point out their *internal* affinities among themselves. I shall then slightly notice their *external* affinities, or those relations by which they are united to the conterminous families of the *Scansores*, that is, to the *Certhiadæ* on one side, and to the *Ramphastidæ* on the other.

First, as to their *internal* affinities. The progression from the *Cuculinae* to the *Coccyzinæ*, or from the parasitic to the building cuckoos, is so gradual, that our only difficulty is to discover the precise point of their junction, or, in other words, which is the scanorial type of each, for by these are all circles invariably united. One of these appears to be the *Cuculus Erythrophthalmus* of authors. From the genus *Coccyzus* of M. Vieillot, the natural series passes into *Crotophaga*, by means of the *Cuculus guira* of Linnæus, ranked by some as a *Coccyzus*, and by others as a *Crotophaga*. By this genus, (the fissirostral type,) we leave the *Coccyzinæ* and enter the aberrant circle by means of the singular bird we shall subsequently describe, and which at the same time opens a passage to *Phænicopterus* : then follows *Leptosomus* and *Saurothera*, two remarkable genera, which all writers have kept together. After these, I am disposed to place the genus *Opisthocomus*, yet with a mark of doubt, not having at this time the opportunity of minutely examining certain parts of its structure. Whether or no the *Coccyzus Geoffroyi* of the Pl. Col. pl. 7, and the *Cocc. Delalandi* of the same work, Pl. 440, two birds nearly as remote from the type of the family as is *Opisthocomus*, really belong to this particular group, remains for future investigation. The last division is only represented by a single genus. This is composed of the well-known honey-guides of Africa : fortunately, however, the affinity between this and the genus *Eudynamis* is sufficiently apparent to leave us in no doubt that they follow each other, and by this affinity we once more return to the typical genus *Cuculus*, and close the circle.

The *external affinities* of the family will be found to strengthen what has now been said on its internal relations. The *Cuculidæ*, as being the most aberrant form of the *Scansores*, is consequently that by which the order *Insessores* is united to the *Rasores*,—the two other aberrant divisions, as before remarked, leading to the *Ramphastidæ* or toucans on one side, and to the *Certhiadæ* or creepers on the other. When we find the *Saurothera*, therefore, with large, serrated, and hollow bills, we see at once the mode in which nature has united the structure of a cuckoo with that of a toucan, while, on looking to the honey-guides, we detect indications of that rigidity in the tail-feathers, about to be fully developed among the

scansorial creepers; the passage being further manifested by the honey-guides climbing with more facility than any other cuckoos. These two points of union I therefore consider as established; because they are further confirmed by well-known analogies, too decided to be questioned. Nor do I feel any considerable doubt on the situation of *Opisthocomus*; for whether this curious genus is the grallatorial type of the *Cuculidæ* or of the *Cracidæ*,—in other words, the last form among the *Insessores*, or the first of the *Rasores*, it certainly appears a form intermediate between the two orders, and bears every mark of being a grallatorial type, corresponding to *Gypogeranus*. As such I shall consider it, until farther discoveries demonstrate this opinion to be erroneous.

But before proceeding farther, it is essential to submit this series to the same analogical test we have applied to the primary divisions of the *Scansores*. For this purpose, I now offer the following table of the

ANALOGIES OF THE CUCULINÆ.

1. Typical Group.		
CUCULINÆ,	{ Bill somewhat conic, the sides thick and rounded,	CONIROSTRES.
Sub-Typical Group.		
COCCYZINÆ,	{ Bill compressed; considerably arched from the base, the tip hooked,	DENTIROSTRES.
Aberrant Group.		
SAUROTHERINÆ,	Seize their prey from a fixed station,	FISSIROSTRES.
		TENUIROSTRES.
INDICATORINÆ,	{ Bill short, thick, tarsus shorter than the outer toe	SCANSORES.

Where the prototype of a group, which in this case is the tenuirostral, has not been clearly ascertained, I have been accustomed in these analogical tables to leave a blank for its future insertion; contenting myself with expressing such opinions on the subject as appear, upon the whole, best supported by facts. This plan, it is true, is not calculated to impress superficial naturalists with a belief in those laws of natural arrangement upon which I have elsewhere expatiated; but it will, at all events, manifest that degree of caution in the application of a theory, which is so vitally essential to the progress of true science. For this reason I have not chosen to designate the tenuirostral type of this family, partly because I feel uncertain as to which of the forms already noticed, this title should be applied and, secondly, because it involves one of the most important affinities in the whole circle of ornithology; this being the point of junction between the insessorial and the rasorial orders.

But if, upon this question, we are obliged to suspend our judgment, the very singular and striking analogies which are manifest

between the other four groups in each column leaves us without any doubt that their station, at least, is natural. The further, indeed, that the philosophic naturalist pursues his researches, the more will he be struck with wonder and admiration at the universality of a few general laws, simple in themselves, yet modified in such a manner as to produce the most inconceivable variety. In the present family this is so manifest, that the analogical characters above given might either be employed, with little variation, to designate the primary groups of the *Cuculidæ*, or those of the tribes of the order *Insesores*. Thus we see that the most conic billed cuckoos are typical, and represent the conirostral tribe. Those which follow, of all others, have the bill *most* hooked and compressed,—these characters being also typical of the *Dentirostres*. The long-billed cuckoos of the genus *Saurothera* depart from the habits of all their family, since we are assured by eye-witnesses that they watch, like the fly-catchers and tyrant shrikes, for their prey from a fixed station, darting upon insects and lizards when they come within reach, and then return to their former seat, this habit being altogether peculiar to fisisrostral types.

The honey-guides, independent of their possessing a tail whose feathers are more stiff than those of any other group in the family, exhibits one of the true characters of a scansorial foot ; that is, a tarsus so short, as to be greatly inferior in length to the outer or versatile fore-toe. This structure is a decided proof that the birds possessing it climb more in a *perpendicular* position than any other ; since it is carried to its maximum of developement in the two typical forms of the *Scansores*, the *Psittacidæ*, and the *Picidæ*. If, in short, the analogies of a group are correctly stated, they will bear comparison not only with every other in the same class of animals, but, as I firmly believe, with every other in the animal kingdom. There is a curious circumstance regarding the honey-guides which must not here be omitted. Upon what principle does this cuckoo, and this only, evince such attachment and familiarity towards man, as actually to call in his aid for procuring food ? The answer is deductable from the foregoing table. We have elsewhere shown that in every natural group one of the types is remarkable, above its congeners for its docility or its attachment to man, and that this type is the scansorial among the perchers, and the rasorial among birds. We may now add, that it is produced under a different form in the *Pachydermes* among the unguled quadrupeds, and in the order *Ungulata* among the Mammalia. These relations, however, will be better comprehended by the following table, each column being viewed as a circular group.

<i>Series of the Cuculidæ.</i>	<i>Series of the Insessores.</i>	<i>Series of the Class Aves.</i>	<i>Series of the Class Mammalia.</i>	<i>Series of the Ungulata.</i>
Cuculinae	Conirostres	Insessores	Quadrumana	Ruminantes
Coccyzinae	Dentirostres	Raptores	Feræ	Solipedes
Saurotherinæ	Fissirostres	Natatores	Cetacea	Anaplotheres
	Tenuirostres	Grallatores	Glires	Edentates
Indicatorinæ	Scansores	Rasores	Ungulata	Pachydermes

It is not absolutely essential for the verification of an ornithological circle that its contents should be compared with those of other circles in a different class of the animal kingdom, yet where doubts may be reasonably entertained on one of the types, as in the present instance, it is highly expedient that the other four should undergo a very extensive comparison, and for this reason the reader will not fail to perceive that they are here submitted to a very searching and severe test,—a test, in fact, which sooner or later they must undergo,—or be rejected. Another reason, also, for introducing them in this place, is to call the zoologist's attention to the last set of analogies, or that which belongs to the Indicators. By this we find that the attachment to man, and wonderful sagacity of the honey-guides, are represented by the parrot in the first column, the gallinaceous birds in the second, the ruminating animals in the third, and the elephant in the fourth, each being in its own series pre-eminently distinguished for social qualities. Further, I may observe, that this extraordinary property of the rasorial type can be traced through all those groups among the *Annulosa*, which I have as yet investigated; but, as this would involve us in an endless field of inquiry and demonstration, the subject cannot be pursued. There is, nevertheless, one analogy between the *Cuculidæ* and the *Annulosa*, which must be touched upon; since we should otherwise leave unexplained the most remarkable peculiarity attached to this family of birds: this, as before intimated, is in the parasitic nature of the typical cuckoos. We search in vain for analogous examples of this habit among these quadrupeds now existing, but on looking to the sub-kingdom *Annulosa*, and investigating the two typical classes of insects, (the *Aptera* and *Ptilota*,) we find that the following groups are all the most aberrant of their respective circles; and as this is the precise station of the cuckoos in the circle of the Scansores, it consequently follows, that they are all mutual representatives of each other.

Cuculus. *Vermes*, (pars) Lin.—*Pediculus*. *Acarus*.—*Stylops*.—*Cynips*, L.—*Chrysis*, L. Nearly the whole of the insects composing these groups, as every entomologist knows, are eminently parasitic; and, according to my researches, they actually occupy in

their several circles, a situation precisely analogous to the *Cuculidæ* among the scansorial birds.

Four out of the five divisions of the family, so far as their analogies are concerned, have now, I trust, been sufficiently demonstrated. So that, whatever genus actually fills the interval between those of *Indicator* and *Saurothera*, we may feel pretty confident, that it would not affect the arrangement of the remaining types. These primary divisions of the *Cuculidæ* I shall consider as sub-families, to which, for the sake of so distinguishing them, I add the termination of *anæ*, to the name of what appears to be the typical genus in each. I must express my suspicion, however, that these sub-families are only equivalent to those groups called *genera* in the order of perchers. Our next inquiry will be directed to the contents of each of these sub-families, for the purpose of ascertaining the natural series of the genera, and we shall first examine the Cuculinæ or Genuine Cuckoos.

(To be continued.)

II.—*The Natural History of British Zoophytes.* By GEORGE JOHNSTON, M. D. Fellow of the Royal College of Surgeons of Edinburgh. (Continued from p. 81.)

PALLAS, who published at this period an admirable history of zoophytes,* was also the advocate of the Linnæan doctrine,† but he adduced no other facts than those furnished by Baster in its aid. He also adopted the opinion of Baster, who in this respect continued in opposition to Linnæus, that the true corallines (*Corallina*) were entirely of a vegetable nature, and his arguments on this head may be summed up as follows: In external appearance and structure a few corallines resemble some fuci, and many of them are like *confervæ*; they differ from other zoophytes in chemical composition, for, on being burned, they emit the smell of vegetable matter, neither do they con-

* P. S. Pallas, Med. Doct. *Elenchus Zoophytorum sistens generum adumbrationes generales et specierum cognitarum succinctas descriptiones cum selectis auctorum synonymis.* Hagæ-comitum, 1776.—“*Princeps in hac classe opus.*”—Hall. Bib. Bot. ii. 566.

† “*Didicimus in Zoophytis, sic jure vocandis, vegetabilem naturam cum animali ita misceri, ut vere anceps et dubia passim sit.*” &c. *Elenc. Zooph. Præf. viii.* It is because of its accordance with the hypothesis of a continuous series in the structure of organized beings, that Pallas mainly grounds his defence of the vegeto-animal nature of zoophytes.

tain a volatile salt or animal oil ; the pores observable in their calcareous portion are too small to be the habitations of polypes, and similar pores can be detected on fuci ; no polypes nor any visible token of life could be discovered by Jussieu in any coralline, a species of which, moreover, a Mr Meese had found growing upon a heath in Friesland ; and lastly, the fructification of corallines is very similar to that of fuci and confervæ.

Were these the deductions of correct observation and experiment they would unquestionably have been conclusive, but some of them were already known to be contrary to the fact, and the others were weakened with doubts and uncertainties. Ellis, conscious of his superior knowledge both of marine botany and zoophytology, put forth an answer to this attack which is remarkable for clear arrangement, and for candid and honourable bearing to his opponent, who had scarcely deserved this at his hand.* Having shewn that the presumed coralline which Pallas had compared to a fucus or sea-weed, was in fact a fucus, Ellis proceeded to prove how widely different every coralline was in structure and texture from any confervæ ; and that the former, contrary to Pallas's assertion, not only gave out when burned " an offensive smell like that of burnt bones or hair," but afforded also on careful analysis both volatile alkali and empyreumatic oil.† " Doctor Pallas," Ellis continues, " proceeds to prove that corallines cannot be animals, as the pores of their calcareous substances are too minute for any polypes to harbour in. These words of the Doctor's seem to imply, as if the coralline substances were only habitations for detached polypes, and not part of the animals themselves. How this affair stands, I hope to have clearly demonstrated long before this, for I have plainly seen, and endeavoured to shew mankind, that the softer and harder parts of zoophytes are so closely connected with one another, that they cannot separately exist, and therefore have not hesitated to call them constituent parts of the same body, and that the polype-like suckers are so many mouths belonging thereto.

* It appears from the Lin. Corresp. Vol. i. p. 186, that Pallas had written disrespectfully of Ellis. In his *Elen. Zoophytorum* the latter, however, is profusely complimented :—" *Ellisium subtilitate atque acumine observationum omnes super eminentem*,"—Præf. p. x.—is praise enough surely, but its sincerity might be questionable.

† This character, as Lamouroux remarks, is insufficient, seeing that the major part of marine plants give out, in burning, odours and products analogous to those of animals.—Cor. Flex. p. 12. It is now well known that chemistry affords us, in its minute analyses, no test between animal and vegetable matter.—See Prout's *Bridgewater Treat.* p. 415, and more particularly Tiedemann's *Comp. Physiology*, p. 48, &c.

“ Now, for the smallness of the pores, which the Doctor has mentioned here (among the Corallines) to be a contradiction to animal life ; he certainly has forgot one circumstance, when he introduces the *Corallium pumilum album*, (Essay Cor. t. 27. f. c.) or his *Millepora calcarea* (Pall. Elench. p. 265,) as an animal, which is, that he there says, it has absolutely no pores at all.

“ As there can be no doubt, but every part of what is called Coralline is necessary to make out such an animal, or being, it will be very difficult, if not almost impossible, to determine the proportion there ought to be between softer and harder parts : and therefore it cannot be thought unreasonable to say, that in some of this tribe the stony parts are by much the greater part of the whole, especially as Doctor Pallas’s objection can be only against the crust, or lapidescent part, as the inside of many of them is far from being hard, being exactly like a *Sertularia*, so that I do not know if it would not be a good definition to one well acquainted with that tribe to say, a Coralline is a *Sertularia*, covered with a stony or calcareous crust ; if the mouths should happen to be very small, their number may make up that deficiency. We see in the greatest number of corallines their surface full of holes ; we saw the same in *Escharas* and *Milleporas* thirty years ago ; since that time magnifying glasses have been improved, so as to shew us, that they are all orifices for polype-like suckers ; why should not we now admit that glasses may be still more improved, so as even to make us able to see what may be the intention and use of these minute orifices, which according to all rules of reasoning, we must suppose to approach in nature to them they are most alike. From this extreme minuteness then of the pores of these *Milleporæ*, confessed to be zoophytes, as well as those of *Corallina officinalis* as before mentioned, it is no great matter of surprise, that Doctor Jussieu could not perceive any animal life in the corallines, nor Doctor Schlosser in the *Millepora calcarea*. As these experiments ought to be attended with many convenient coinciding circumstances that do not often happen to persons who only go to the sea side, perhaps for a few days or hours, so that it is unreasonable to conclude, because they have been unsuccessful, that more accurate observers may not be more fortunate at another time.” — Having thus disposed of an argument which he could not distinctly answer, Ellis goes on to notice the fact of the coralline which had been found on Bergummer heath in Friesland, and which the vagueness of the manner in which the discovery was announced permitted or warranted him to ascribe to accident ; and he then concludes his admirable essay with a faithful and minute account of the

fructification of the confervæ, and proves to a demonstration that when Baster and Pallas attributed a similar fructification to corallines, they had very erroneous ideas of the subject.*

The discussion rested here, and zoophytes, including the sponges and corallines, have been ever since enumerated among the subjects of the animal kingdom, although some, among whom Spallanzani may be particularized, continued in the belief that the corallines and the sponges were vegetables. But naturalists continue to be divided in opinion relative to the nature of acknowledged zoophytes, for many still speak of them as intermediate beings partaking of a two-fold nature, while others defend their claims to pure animality. No new doctrine has been promulgated; neither indeed have the old been defended or attacked by any other facts or arguments than those already referred to, and with these before me I cannot hesitate to give my assent to the opinion of Ellis. No one denies that the polypes considered abstractedly from their polypidoms are really animals;—their quick and varied movements,—their great irritability,—the existence of a mouth and stomach,—the nature of their food, its digestion, and the evomition of the indigestible remains are incontestible proofs of this;—and it seems improbable, to say no more, that this animal should be fitted round with a case that grew independent of it and from a different cause. And the case itself has no analogy, as Ellis shewed very clearly, either to bark or to wood: it possesses the structure of neither of them, nor is it formed in the same manner by the addition of concentric layers, nor does it contribute to the formation of new parts, but, like the shell of testaceous mollusca, it is extravascular and inorganic, and when once formed suffers no other change than what external injuries or time may operate. If possible its coincidences with the skin of cellular plants are even fewer: the one is a living part which has very important functions to perform in relation to the plant itself and to the atmosphere or circumfluent medium in which it lives; the other exhibits no action characteristic of life, and is nothing more than a condensed al-

* Phil. Trans. Vol. lvii. p. 404, &c.—Pallas appears to have been convinced by this essay that the Corallines were animal; and he acknowledged that in reference to the land species he had been imposed on.—Lin. Corresp. i. 227, and 568. Yet it should be remembered that Captains Vancouver and Flinders observed on the shores of New Holland, at considerable heights above the level of the sea, arborescent calcareous productions which they considered to be corals. Peron says they are either corals or vegetables incrustated with calcareous matter; and Dr Clarke Abel has proved that they are the latter.—Edin. Phil. Journ. ii. 198.

buminous or calcareous sheath, appropriated solely to support or protection.*

But although I agree with the advocates of the animality of zoophytes in general, I cannot go the length of Ellis in considering it proved that sponges and corallines belong to the same class. Ellis, we have seen, knew that no polypes were to be found in sponge, and their existence in the pores of corallines was inferred merely from the structure of these and their chemical composition. They have been examined by subsequent naturalists fully competent to the task, and under the most favourable circumstances,—in particular by Cavolini and Schweigger,—and the result has been a conviction that these productions are truly apolypous. Now this fact, in my opinion, determines the point, for if they are not the productions of polypes, the zoologist who retains them in his province must contend that they are individually animals, an opinion to which I cannot assent, seeing that they have no animal structure or individual organs, and exhibit no one function usually supposed to be characteristic of that kingdom. Like vegetables they are permanently fixed,—like vegetables they are non-irritable,—their movements, like those of vegetables, are extrinsical and involuntary,—like cryptogamous vegetables or algæ they usually grow and ramify in forms determined by local circumstances, and if they present some peculiarities in the mode of the imbibition of their food and in their secretions, yet even in these they evince a nearer affinity to plants than to any animal whatever.

II.—ON THE STRUCTURE AND FUNCTIONS OF THE POLYPES ABSTRACTEDLY CONSIDERED.

On the continent the term *Zoophyte* has of late been used in a very extensive sense, so as to include every animal which exhibits a circular disposition of parts radiating from a common centre, and many also in which this character is little or not at all obvious. In this country the word has never been so employed excepting in translations from a foreign language: no English writer ever thinks of calling an intestinal worm, or a sea-jelly, or a star-fish, or even the

* I do not enter into the question whether the *Confervæ* are real animals or not, because, whatever conclusion we might adopt, they would not come within our definition of a zoophyte or polype, since they assuredly have neither mouth, tentacula, nor stomach. Nor need I discuss the propriety of instituting, with Treviranus, a fourth kingdom of animated nature, composed of the zoophytes and aquatic cryptogamia, as my object and plan is only to describe what have been almost universally considered zoophytes.

infusory animalcules, a zoophyte ; but he applies the name to no other creatures than those which in their form, or most remarkable characters, recall the appearance of a vegetable or its leading properties. In this restricted sense I also use it in these essays, or rather with a still narrower circumscription, having assigned what appear to be sufficient reasons for removing the corallines and sponges from the category, and restoring them to the vegetable kingdom, to which the earlier naturalists believed they had a rightful claim. The definition of a zoophyte is thus considerably simplified, but there remains sufficient variety and discrepancy in the constituents of the order to render that definition in some degree vague and incongruous. The fact is—the classification of molluscous, and radiated, and acritous animals requires to be recast : the limits between them have not been determined with undisputed precision, and it seems probable that there are in each class some tribes which will pass from one to the other as discovery proceeds. It has been recently proposed* to remove a large proportion of zoophytes hitherto considered legitimate subjects of their order to the mollusca, which, about the year 1815,† had received a considerable accession to its numbers from the same source ; but so far from acknowledging the propriety of the proposed translation, I incline to agree with Lamarck‡ that it would be better to separate again the colonized zoophytes from the mollusca, and form with them, and with such zoophytes as have an analogous organization, a distinct class, to occupy the wide interval between the molluscan and radiated types, allied to the former by the non-symmetrical figure of the body, and to the latter by the circularity of the oral members. It is, however, unnecessary to enter here upon this discussion, for my intention is to describe what are usually reckoned zoophytes, without having regard to the naturalness of the group considered as a whole, and with this view I adopt the class as it was long ago established by Solander and Ellis, excepting only the corallines and sponges, which will form the subject of separate monographs. The following definition may serve to characterize the class :

Animals avertebrate, inarticulate, soft, irritable and contractile, without a vascular or separate respiratory or nervous system : mouth superior, central, circular, edentulous, surrounded by tubular or more

* Thompson's Zoological Researches and Illustrations, p. 92.

† Savigny's Memoires sur les Animaux sans Vertebres. Seconde Partie. Paris, 1816, 8vo.

‡ Hist. Nat. des Anim. s. Vert. iii. 82—87.

commonly by *filiform tentacula*: *alimentary canal variable*,—where there is an intestine the anus opens near the mouth: *asexual*; *gemmiparous*: *aquatic*.—The individuals (*Polypes*) of a few families are separate and perfect in themselves, but the greater number of zoophytes are compound beings, viz. each zoophyte consists of an indefinite number of individuals or polypes organically connected and placed in a calcareous, horny or membranous case or cells, forming, by their aggregation, corals or plant-like Polypidoms.

In this definition there are two parts which require our particular attention—the *Polype* whose presence is essential, and the *Polypidom*,* which is the house or support of the polype, and which, though commonly present, is yet not necessary to the existence of a zoophyte. To the structure and functions of the former we limit ourselves in this chapter; and should the reader find the outline given in relation to some of the families too slight and sketchy, we may advertise him that he will find it filled up with greater detail in the observations which it is intended to prefix to each separate order.

The description usually given of the structure and functions of polypes in general has been derived principally from an examination of the *Hydra*—a naked species which inhabits ponds and ditches. A polype is thus represented as being a somewhat globular or cylindrical body of small size, of a homogeneous gelatinous consistence, and very contractile, in the centre of which there is excavated a cavity for the reception and digestion of its food. The aperture to this cavity is placed on the upper disk of the body, and is encircled by one or two series of filaments or tentacula which are used to capture the necessary prey, and bring it within reach of the lips; while the opposite end serves the purpose of a sucker to fix the creature to its site, or being prolonged like a thread down the hollow sheath, to connect it with its fellow-polypes of the same polypidom, which by this means become compound animals, “the whole of whose parts are animated by one common principle of life and growth.” There are no organs of sense, no limbs appropriate to locomotion, no circulating vessels, no nerves, nor lungs, nor gills, no chylopoetick viscera, nor intestine, for there is “but one conduit both for purgation of their excrements, and reception, of their sustenance;” and when to these negations there is to be added the want of generative organs, a being of simpler organization than the

* I borrow this term from the translator of Lamouroux's work on Corallines. The Rev. Mr Kirby uses the word *Polypary* to express the same thing. Both of them are translations of the *Polypier* of the French naturalists.

polype can scarcely be conceived; and, perhaps, it is actually the simplest, for the infusory animalcules which had been placed underneath them in the scale of organization, are now known to possess a much more complex structure.

Such is the idea of a polype we obtain from the writings of Ellis, and the description of its general structure given by Lamarck,* after an interval of seventy years, is identically the same. Some few species, classed by the predecessors of the latter among zoophytes, had in the meantime been ascertained to be differently constructed, and furnished with less simplicity, but being in consequence removed into a different category, they were not allowed to disturb the received opinions on polype anatomy. Still more recent discoveries have shown, however, that these are very erroneous, and that the animals of even our native polypidoms form at least two classes distinguished by a very remarkable dissimilarity of organization. By the one they are allied to the tunicated and acephalous mollusca, more especially to the compound families of the former, and hence may be denominated *Ascidian* polypes; by the other they form a link of the chain or circle which associates the radiated animals, and, assuming the hydra, for their representative, we shall call them *Hydraform* polypes.

The ascidian polypes never occur in a separate and naked form, but are always placed within the cells of a polypidom of a calcareous, membranous, or fibro-gelatinous consistence. The form of the cells in many genera, as *Eschara*, *Flustra* and *Cellepora*, suggests a belief that their tenants, although arranged in a close and determinate manner, are each separate from their neighbours and complete in themselves, and this opinion is held by some of our best naturalists; but the observations of Professor Grant seem to have proved that the polypes of the *Flustra* are connected together by a living

* Anim. s. Vert. ii. 10. Bosc, Vers, ii. 216.—Lamouroux in 1810 and 1812 had indeed asserted that the polypes with polypidoms could not, in relation to their structure, be compared with the fresh-water hydra, but that they approximated nearer than was believed to the mollusca, of which they might at some future time be considered a family. The opinion certainly rested on few and hasty observations, and no anatomical details were given in its support. See his Edit. of Soland. Zoophyt. pref. p. vii. For example, he not only recognizes a relationship between *Lobularia* and *Actinia*, but he tells us that the polypes of the *Flustra*, *Cellaria* and *Sertularia* are similar to those of *Lobularia*! Coral. Flex. p. 332. Such loose observations as these are have no influence on the progress of discovery. The observations of Savigny were evidently more specific and correct; but I am not aware that the details have been yet published.—See his Mem. sur les Anim. s. Vert. ii. p. 65.

axis, and are hence truly compound beings ; and since the Vesiculifera, which are admitted to be composites, belong unquestionably to this remarkable form of animated entities, it is safer, for the present, to consider all the ascidian as compound polypes.* There is nevertheless a remarkable difference between them and the hydraform tribes in their mode of composition. In the latter the polypes are simply developements of the common central fleshy mass, identical with it in structure and texture ; in the former each individual is a distinct organism, and the medium which binds them together, whether vascular or ligamentous, has its own peculiar character. The one we may compare to a chain of which all the links are welded,—the other to a necklace where the beads are strung together by a percurrent thread. To express this distinction we shall call the hydraform *compound* polypes, and the ascidian *aggregated* polypes.

The body of the ascidian polypes is lengthened, somewhat cylindrical or at times bulged at the base, and when at rest lies, in the form of a syphon, doubled up upon itself in the cell, (Fig. 1, †) to which it is connected by a tendon at the bottom, and by the duplicature of a thin membrane round the aperture, so that it is impossible it should ever voluntarily leave the cell to swim at large, as Baster and others have maintained. The head or upper end is surrounded by a single row of tentacula, (Fig. 2, a,) which are solid, filiform, and non-contractile, for the animal can only shorten them by rolling them up in a spiral manner: they are apparently smooth, but with a high magnifier it is ascertained that they are clothed with numerous fine cilia,‡ which are in ceaseless

Fig. 1.



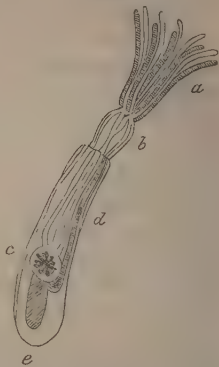
* “ The polypi are most intimately and inseparably connected with the *axis* by three parts of their body, and are only digestive sacs or mouths developed by the axis, as in all other zoophytes, for the nourishment of the general mass. By the *axis* of a zoophyte, I understand every part of the body excepting the polypi, whether of a calcareous, horny, or fleshy nature. The exact mathematical arrangement and forms of the cells of *Flustra* is incompatible with their existence, as separate and independent beings, but is quite analogous to what we are accustomed to observe in *Cellariæ*, *Sertulariæ*, *Plumulariæ*, and many other well-known compound animals.”—Grant in Edin. New Phil. Journ. iii. 116. See also Blainville, Man. d’Actinologie, p. 99.

† The figure represents the polypes of *Flustra membranacea* in a state of retraction.

‡ The Rev. Dr Fleming is the first who discovered this structure and its important use in creating respiratory currents.—See Wern. Mem. iv. 488–9. The

motion, and are supposed to perform the office of breathing organs by keeping up a constant current of water along their surfaces, which sets in towards the mouth in an invariable direction; and from the incessant revolution of particles within the mouth and the gullet, observed by Professor Grant, this organ seems to be also ciliated internally. The more especial use of the tentacula is to arrest the prey which chance floats within their reach and conduct it to the mouth,—a simple aperture placed in the centre of the tentacular circle, and which is armless, having in no instance either jaws or teeth. It is the entrance into a long membranous gullet (*b*,) of perfect transparency, and which can be traced through its equally transparent envelope, to its termination in a somewhat globular and comparatively large organ placed near the curvature of the body, and rendered opaque partly by the greater thickness and fleshiness of its structure, but perhaps more so by the nature of its contents. This is the stomach (*c*,) and from the side of it there proceeds a narrow intestine (*d*,) which follows a straight upward course along the side of the gullet, and opens at the aperture of the cell by a separate orifice from which the undigested remains of the food are ejected. There is another organ of a roundish figure appended to the bend of the intestine, which is supposed by some to be an ovarium (*e*,) but it seems not unnecessary to remark, that this appropriation of it to the generative function has perhaps no better proof than what is derived from a similarity of position between it and the supposed ovarium of the compound mollusca. It is, I presume, the organ which Blainville says he is willing to believe performs the functions of the liver,* an opinion in which I am disposed to concur.

Fig. 2.



No trace of a nervous or vascular system of any kind has been detected, nor is there any organ of sense, but the polypes are notwithstanding very sensible of external impressions.† When

currents had been previously observed, but had been attributed erroneously to the movements of the tentacula.

* Manuel d'Actinologie, p. 72.—Fig. 2 represents the polype of *Vesicularia imbricata* highly magnified. It is copied from Thompson's *Zool. Ill. Memoir*, v. pl. 1, fig. 4.

† “But as we perceive, in these animals, phenomena which take place by the medium of nerves in animals of a more elevated order, that is to say, sensi-

left undisturbed in a glass of fresh sea water, they push their tentacula beyond the mouth of the cell by straightening the body; and then expanding them in the form of a funnel or bell, they will often remain quiet and apparently immoveable for a long time, presenting a very pretty and most interesting object to an observer of "the minims of nature." If, however, the water is agitated they withdraw on the instant, probably by the aid of the posterior ligament or muscle;—the hinder part of the body is pushed aside up the cell, the whole is sunk deeper, and by this means the tentacula, gathered into a close column, are brought within the cell, the aperture of which is shut by the same series of actions. The polypes of the same polypidom often protrude their thousand heads at the same time, or in quick but irregular succession, and retire simultaneously or nearly so, but at other times I have often witnessed a few only to venture on the display of their glories, the rest remaining concealed; and if, when many are expanded, one is singled out and touched with a sharp instrument, it alone feels the injury and retires, without any others being conscious of the danger, or of the hurt inflicted on their mate.

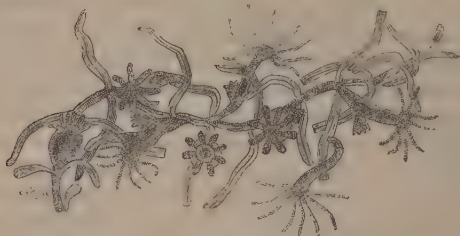
Of the hydraform polypes a sketch of their anatomy has already been given in the beginning of this chapter. They differ from the ascidian in their figure, which is somewhat globular or cylindrical and straight; in the position of the body, which is vertical; in the homogeneity of their composition, which is a semitransparent glairy gelatine, full of microscopic coloured granules;* and very remarkably, in being

bility and voluntary motion, it is not improbable that in them the nervous substance is mixed with their gelatinous or mucous mass, without being demonstrable as a particular tissue."—Tiedemann's Comp. Phys. p. 64.

* Trembley having ascertained that the colour of the polype resides in these granules, and that it varies with the quality of their food, of which the nutritive part or chyme passes first into the granules of the stomachal cavity and then gradually into those placed more towards the surface, infers that they are a kind of *glands* or rather *vesicles*, which have the power of sucking in and again transpiring the nutritive fluid.—Hist. des Polypes, p. 132. Lamarck adopts this opinion, Anim. s. Vert. ii. 9, which is probably correct, but it ought to be remembered that it is somewhat hypothetical. Consult in relation to this subject Roge's Bridgewater Treatise, Vol. ii. p. 77–8, Carus' Comp. Anat. Eng. Trans. Vol. i. p. 25, §. 23; and the reader will find Edwards' and Dutrochet's opinions on the nature of the elementary corpuscles in Bostock's Elementary System of Physiology, Vol. iii, p. 348 et seq. Tiedemann sums up our *actual* knowledge in the following sentence.—"In animals of a simple structure, polypi, entozoa, and some others, in which no vascular system for the movement of the humours has hitherto been discovered, the nutritious assimilated liquid passes directly into the parenchyma of the body, with which it enters into combination."—Comp. Physiology, p. 35.

contractile at every point, so that they can change the figure of their bodies from a globe to a cylinder, or distort it with strictures, and can shorten and extend the tentacula at will, sometimes to an extent which is astonishing, although nothing like muscular tissue can be detected in their structure.* When therefore they have occasion to conceal themselves within their cells, they are not necessitated, like the ascidian, to bend the body in order to obtain sufficient space for the tentacula, but they shorten the body and the tentacula at the same time, causing the one to assume a more globular form, and the other to dwindle down to mere knobs or papillæ (Fig. 3.)† The tentacula, even when fully extended, have not the same appearance,—

Fig. 3.



they taper a little, and are roughened with minute warts generally arranged in an imperfectly verticillate fashion, and in their evolution they are less regularly campanulate, one or more being usually in action and moving from the outline of the circle. The stomach is not a distinct sac, but a simple cavity towards the centre of the body, “neither figured nor limited by particular membranes,” and from which the indigestible remains of the food are ejected at the same aperture by which it had entered, for the aperture in the base of the stomach or intestine seems to be appropriated to other offices. And in reference to its relation with the polypidom there is this difference,—the hydraform polype is not connected with the cell by any membrane or ligament, but rather sits free within its miniature cup, retained there only by the gelatinous living pedicle which is prolonged from its base down the sheath, and binds all the polypes of the polypidom in one sympathising family.

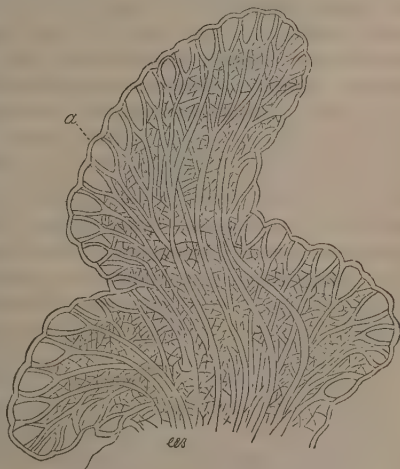
But this description is applicable only to the Hydra itself, and to those compound species which tenant the cups of the plant-like polypidoms embraced in the order Zoophyta hydroida. The polypes of the asteroid zoophytes, although evidently modelled on the

* Trembley, Mem. pour l'hist. des Polypes, p. 25. Carus' Comp. Anat. i. p. 43.

† The figures represent *Hydra viridis* in various attitudes and states.

same type, have made considerable advances towards complexity of organization, and their relation to the polypidom is entirely altered. Hitherto the polypidom has been, what its name imports, a cell for retreat in danger, and in ordinary an extravasular insensible sheath to protect the contained animal from the rude contact of the circumfluent element ; but now we find it occupying an internal position, and instead of a covering it has become a sort of prop or skeleton to a fleshy crust in which the polypes are immersed. In the *Alcyonium* this interior support is scarcely to be recognized in some calcareous spicula scattered through the central mass, but in *Pennatula* it forms a bone stretched like a vertebral column from one extremity to the other, and in *Gorgonia* it is ramified into branches after the manner of a tree. It is this axis, under whatever shape it appears, which is the true analogue of the polypidom of the ascidian and hydraform polypes, although the name certainly has no suitableness here, for the polypes cannot only not nestle in that which is uncellular, but they have no immediate connection with it. They, as already mentioned, are found lodged in a sort of cell (Fig. 4. *a.*) ex-

Fig. 4.



cavated in an exterior sarcoid crust, which constitutes the main bulk of the polypiferous mass, and which, in fact, is nothing more than a production of the bases and outer skin of the polypes hardened by a deposition of calcareous granules and spicula, and made more coriaceous in texture, to bear with impunity the contact and ruffling of the water.* This crust is accordingly a living irritable structure, permeated by tubes prolonged from the po-

* “ Lorsqu'on observe les *Alcyons* dans leur état naturel, la ligne de démarcation entre ces deux parties paraît bien tranchée, et on pourrait au premier abord, croire ces petits animaux logés dans des cellules au pourtour de l'ouverture desquelles ils adhéreraient ; mais quand on élève à l'aide d'un acide étendu d'eau,

lypes and by capillary canals, for the conveyance of water and nutriment to every part.

The connection between the crust and the polype is therefore of the most intimate kind, and if for conveniency the latter are separately described, the reader should ever remember, that this separation is a forced and artificial one. An asteroid polype mass is known by the orifices of the cells forming on the surface a mark more or less resembling a star, as this is painted in maps—hence the name of the order : when the polype is protruded from this cell the body has a cylindrical figure, its upper disk surrounded by eight short pectinated hollow tentacula, in the centre of which the mouth is situated, leading into a distinct stomach, which is as it were suspended in the centre, and sustained there by eight thin membranous septa, which, stretched between the outer surface of the stomach and the inner surface of the external tunic, divide the intervening space into eight equal compartments. The base of the stomach is perforated like the mouth, and from the margin of the aperture depend eight white tortuous filaments, which hang, either loose or connected to a continuation of the membranous septa, in a wide abdominal cavity, immediately underneath the stomach. This cavity is again continuous with a tube which penetrates the common mass, communicating freely by anastomoses with the tubes of other polypes, and with a fine net-work of capillary vessels, formed in the spaces between them, by means of small apertures in their walls. (Fig. 4. *) In this manner there is effected a very free communication between the individuals of each common mass, so much so, that the water swallowed by any one polype of it rapidly permeates the whole. † By tracing the course of the fluid we may obtain a clearer view of the organization. The water then enters the mouth, and passes through the cylindrical gullet and stomach into the abdominal cavity : thence part of it, flowing through the canals formed by the septa stretched between the stomach and outer tu-

le dépôt calcaire dont la base du polype est environnée, on voit qu'il y a entre ces parties continuité organique, et que la cellule polypifère n'est autre chose que la portion inférieure du corps du polype qui, en se contractant, rentre en lui-même, comme nous l'avons déjà vu pour les Alcyonides. Le polypier commun n'est en effet autre chose que la résultat de l'aggrégation intime de la portion basilaire des polypes." Milne-Edwards in Ann. des Sc. Nat. iv. 336. an 1835. The student may compare this with Lamouroux's description of the *Gorgia*. *Corallina*, p. 198.

* A longitudinal section of *Alcyonium digitatum*.

† Milne-Edwards has proved this by a decisive experiment.—Ann. des Sc. Nat. iv. 328 and 338, an 1835.

nic, passes into the tentacula with whose cavity the canals are continuous, and by means of small apertures in the sides of the hollow tentacula. the water penetrates and unfolds the cilia, with which these tentacula are fringed. By the distension from the water thus introduced, the body of the polype and its tentacula are forced beyond the surface, and every organ fully displayed. Another portion of the water in the abdominal cavity passes into the tube continuous with it, fills it and the others in connection with it, and by means of holes in their parietes finds access into the intermediate capillary net-work, so that the whole mass is permeated with the fluid, and all and every portion distended to a bulk which may be more than double of that which it had previous to the introduction of the fluid, and which it resumes when, from the application of irritants, the polypes contract themselves, and by their contractions force out all the imbibed water.—The tortuous filaments suspended from the base of the stomach have been generally taken for ovaries, but the observations of Dr Grant and M. Edwards seem to have disproved this opinion. The latter of these eminent naturalists believes them to be analogous to the biliary canals of insects. *

The affinity in structure between the asteroid zoophytes and those which we name *helianthoid*, from their resemblance to some compound flowers, is evident, although in the latter there is a still further recession from the simplicity of polype anatomy. We find in them a mucous coat covering the surface,—beneath it a layer of transverse submuscular fibres, while the body is supported by numerous strong cartilaginous lamellæ arranged in longitudinal parallelism. Each of the lamellæ is attached inferiorly to the circular layer which constitutes the base of the animal, and divides into three fascicles,—one which goes to the stomach and to the rim of the oral aperture,—another to the roots of the tentacula,—and the third is prolonged to the outer labial border, where it is bent back to form its free margin.† The stomach has its distinct and proper parietes; there are special organs for the developement of the reproductive gemmæ; and even some traces, as is asserted, of a nervous system; while the numerous tentacula are perforated like canals, in order that the water of respiration may be introduced into the interior, and the nutritive fluids more thoroughly influenced by its oxygen.

It has been mentioned already that there is no proper circulation—no movement of a fluid analogous to blood in appropriate ves-

* Ann. des Sc. Nat. iv. 331; an 1835.

† Blainville, Man. d'Actinologie, p. 68.

sels—in any zoophyte, but in many of the hydroida it has been discovered that there is a continuous and uniform current of a fluid, containing granular bodies which have themselves a rotatory motion, within the tubular portions of the horny polypidom. Cavolini first detected this sort of circulation, which is very similar to what has been observed in the *Chara* and other plants, in the *Sertularia*; and recently Mr Lister has confirmed this discovery, and ascertained the existence of the same phenomenon in almost all the genera of the order. The result of his curious observations is thus summed up by Dr Roget. “In a specimen of the *Tubularia indivisa*, when magnified one hundred times, a current of particles was seen within the tubular stem of the polype, strikingly resembling, in the steadiness and continuity of its stream, the vegetable circulation in the *Chara*. Its general course was parallel to the slightly spiral lines of irregular spots on the surface of the tube, ascending on the one side, and descending on the other; each of the opposite currents occupying one-half of the circumference of the cylindric cavity. At the knots, or contracted parts of the tube, slight eddies were noticed in the currents; and at each end of the tube the particles were seen to turn round, and pass over to the other side. In various species of *Sertulariæ*, the stream does not flow in the same constant direction; but, after a time, its velocity is retarded, and it then either stops, or exhibits irregular eddies, previous to its return in an opposite course; and so on alternately, like the ebb and flow of the tide. If the currents be designedly obstructed in any part of the stem, those in the branches go on without interruption, and independently of the rest. The most remarkable circumstance attending these streams of fluid is, that they appear to traverse the cavity of the stomach itself, flowing from the axis of the stem into that organ, and returning into the stem, without any visible cause determining these movements.”*

This sort of circulation is not to be confounded with those aqueous currents which flow over the surfaces of the external organs of the ascidian polypes. † It has been already stated that in-

* Bridgew. Treat. Vol. ii. p. 233. See also Tiedemann's Comp. Physiol. p. 150. and Ent. Mag. Vol. iii. p. 174.—Dr Sharpey appears to have discovered that the currents are produced by vibratile cilia.—Edin. New. Phil. Journ. for July 1835.

† Dr Grant repeatedly asserts that the tentacula of the hydraform polypes are also ciliated, and I would not have dared to controvert this statement, although my own observations had long ago satisfied me of its incorrectness, had it not been at variance with the observations of others who have especially directed their attention to the subject. Raspail states that he was not able to discover

numerable cilia or miniature lamellæ clothe the surfaces of their tentacula, and by their rapid vibrations drive a constant equable stream of water along one side, which returns along the other in an opposite direction; and by this means the purposes of respiration are effected, and the nutrient fluid fitted for assimilation with the body. The cilia, to adopt the language of Professor Grant, "are disposed and moved in such a manner as that the streams which they produce in the surrounding water are driven along the one side of the tentaculum, from the mouth of the polypus, and on the other side of the tentaculum always towards the mouth of the polypus. And we never find that direction of their motion reversed, or that direction of the currents changed, by which their respiration is effected, and their food obtained. They are vibratile on the arms of most of the lower zoophytes, as sertulariæ, plumulariæ, serialairæ, cellariæ, flustræ, alcyonia, which keep their arms stiffly out in a regular campanulate form, while the currents flow to their mouth. When we watch the sides of the tentacula of these animals with attention, and by the aid of powerful glasses, we see the extreme rapidity of the movements, and the remarkable regularity of the form, disposition, and motions, of those singular vibratile bodies. From the number of them, exceeding sometimes 400,000,000 in a single animal, it is not probable that their extraordinary movements are the result

anything analogous to cilia on the tentacula of the Hydra; (*Org. Chem.* p. 293,) and Dr Sharpey says, that in the form of polype "which exists in most true species of Sertularia, Campanularia, and Plumularia, and in allied genera, the tentacula or arms are destitute of cilia, and incapable of giving an impulsion to the water."—*Cyclopædia of Anat. and Physiology*, Vol. i. p. 611.

Raspail maintains that there are really no cilia, but that the appearance of them is occasioned by currents of fluid aspired or drawn to and within the body, and expired or driven from it, and these currents are said to be produced by the difference of temperature between the fluid in the body and exterior to it. "A happy conjecture led me to consider these vibratory cilia as being merely streams of a substance either inspired or expired, but at any rate of a different density, and consequently of a different refractive power from the surrounding medium." P. 293.—"The cilia of a respiratory organ are, then, the effect of a difference of density between the water expired, and that in which the animal swims. Now there is no difficulty in admitting that, since caloric is disengaged in the respiration of animals of a superior order, it may also be disengaged, although, if we may so speak, in a microscopic proportion, during the act of expiration in the Infusoria and the Molluscæ. The difference, then, between the density of the water expired and that of the surrounding water, proceeds from a difference of temperature." P. 297. This explanation of Raspail's is completely disproved by the observations of Professor Grant on the Beroë; (*Trans. Zool. Soc.* i. p. 11.) and of Dr Sharpey on numerous animals.—*Edin. New Phil. Journ.* July 1835.

of any spontaneous efforts of the animal, or are accompanied with any kind of perception or consciousness in these animals, which have never been found to present a single nerve in their bodies. The independent nature of the motion of those minute respiratory organs is observed when we cut off the tentacula altogether; and observe, that they still continue the rapid vibration of their cilia; and though severed from the polypus, the tentacula continue to move forward through the water; the severed tentaculum of a flustra is seen to swim through the water like a worm. The number of those organs varies much; they are eight in *Serialaria lendigera*, and in *Plumularia falcata*, fourteen in *Cellaria avicularia*, twenty-two in *Flustra carbasea*. The effect of those motions of the cilia again is obviously to change the stratum of water constantly in contact with the most delicate fleshy parts of those zoophytes, with the highly organized soft irritable fleshy polypi. Thus they aerate the cellular texture of their body, at the same time that they bring the animalcules—their ordinary food—within the grasp of the tentacula.”*

All polypes—ascidian and hydraform—subsist on animal matter, and probably only feed upon it in a living state. The smaller species seize on worms and animalcules brought accidentally within reach, or carried into the vortex formed by the play of the tentacular cilia: the larger kinds (*Helianthoida*) swallow small crabs and shelled mollusca, rejecting the shells after having sucked out the soft contents. The food, in the *Hydroida*, is dissolved and necessarily made chylous in the stomach, and directly absorbed from it; but in the ascidian it is probable that the process of chylickation is not completed until the food has passed into the intestine. In the higher animals the chyle is mixed with the blood and exposed to the influence of atmospherical air before it is fitted for assimilation and growth; and though bloodless this air is no less necessary to the growth and existence of polypes, which soon languish and die in vessels of unrenewed water. Hence the current within the tubes of some polypidoms which has been noticed: it is the movement of the nutrient fluid which has found its way from the alimentary sac to the surface of the body, where it is subjected to that agent which alone can fit it for the purposes of life.

* Lect. Comp. Anat. in the *Lancet*, 1834, Vol. ii, p. 959.—“All the cilia appear to commence and to cease their motions at the same moment. The constancy with which they continue would seem to exclude the possibility of their being the result of volition; and they are, therefore, more probably determined by some unknown physical cause, dependent, however, on the life of the animal.” Roget, *Bridgew. Treat.* i. 173.

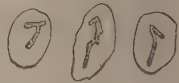
Amongst zoophytes there is no distinction of sexes, but every individual appears to be capable of producing reproductive buds or gemmules.* For the production of these there is, in the opinion of some good observers, a peculiar organ or ovarium in all the ascidian tribes, and it is certain that their gemmules are always generated within the polype cell. There are appropriate productive organs also in the *Helianthoida* and *Asteroida*, in the former situated between the ligamentous dissepiments which radiate from the mouth to the base, between the stomach and the skin ; and in some of the latter attached to the membranous dissepiments in the abdominal cavity, while in others the gemmules appear to sprout from every part of the abdominal cavity, and of the tube continuous with it. On the contrary, there is no local generative organ in any *Hydroida*—all are “ full of reproductive life :” in the *Hydra* germs, similar in all respects to the substance of the body, sprout indiscriminately from every part of the surface ; in the *Tubulariadae* they pullulate from underneath the tentacula where they may frequently be observed in clusters, and, in both of these families, the germs are naked or uncovered. But in the extensive family which embraces the *Sertularia* and all its subgenera, the gemmules, attached in general to a central placenta, (which is but a continuation of the fleshy central part of the stem,) are enclosed in vesicles of the same texture as the polypidom itself, and neither proceed from, nor have any immediate connection with, the proper body of the polype, being evolutions from the pith or flexy axis which connects the polypes together, and binds the various heads into one whole.—Such is a brief summary of the facts ascertained on this head, but it behoves me to mention that it is, to a certain extent, at variance with the opinions of Professor Grant. He maintains, from his numerous observations on a great variety of zoophytes, that the gemmules by which these animals propagate are highly organized portions of the gelatinous substance of the parent, formed “ in almost every known zoophyte,” and not merely in the *Hydrazoa*, as we have limited it, “ by the common connecting substance of the animal, and not by the polypi, which appear to be only the mouths or organs of digestion. In *Plumulariæ*, *Sertulariæ*, *Campanulariæ*, *horny Cellariæ*, *Antennulariæ*, the ova are formed in ve-

* “ These corpuscles differ from true ova and seeds, which are ripened by fecundation, inasmuch as the substance of which the new being is formed is not, as ova and seeds are, enclosed in a special envelope, which is separated from them at the moment of the development of the germ, and inasmuch as the formation of the new individual is owing to the entire substance of the reproductive corpuscle.”—Tiedemann's *Comp. Phy.* 42.

sicles which originate from the centre of the stem. In *Flustræ*, calcareous *Cellariæ*, and some others, the ova are formed in the cells, but *exterior to the bodies of the polypi*, which disappear before the ova arrive at maturity. In the *Lobulariæ*, *Gorgoniæ*, *Spongiæ*, *Clione*, &c. the ova are formed and matured in the *common fleshy substance* of the body before they advance to be discharged through the polypi, or the fecal orifices.”*

The gemmules exhibit considerable variety in colour,—they are milk-white, yellow, red, pink or green, but sometimes the colour is not fully developed until near maturity. In all the ascidian polypes they are globular or have a tendency to that form, and appear to preserve it until after their discharge from the body ; but in the *Hydroida* this is not the case, for although spherical in their earlier stages, “their shape alters on approaching maturity ; it elongates, becomes elliptical, next prismatic, and at length each corpusculum issues as a perfect animal from the orifice of the vesicle,” and exhibits in figure and in motion much resemblance to the little leech-like *Planariæ*. (Fig. 5.†) The gemmules are all

Fig. 5.



clothed with vibratile cilia similar to those of the tentacula of the parents. Sometime previous to their discharge from the polypidom they are observed to be in a constant rotatory motion, by which their birth seems to be facilitated ; and now at liberty in the water they move and swim about as if they were guided by volition and sense, whirling at the same time on their own axis.‡ This freedom to move whither they list may continue for several hours, or even for two or three days, before a proper site for their permanent stay and future growth is found, when they begin to shoot up rapidly into those beautiful forms particular to each species, as the Supreme Being has ordered and determined. The transformation of the ova, says Dr Grant,

* Edin. Journ. of Science, No. 14.

† The figures represent the gemmules of *Plumularia pluma*. For the drawing I am indebted to my friend Dr Coldstream of Leith.

‡ In reference to those of *Flustra carbacea*—and the observation appears to be very generally applicable—Dr Grant says—“they are very irritable, and are frequently observed to contract the circular margin of their broad extremity, and to stop suddenly in their course when swimming ; they swim with a gentle gliding motion, often appear stationary, revolving rapidly round their long axis, with their broad end uppermost, and they bound straight forward, or in circles, without any other apparent object, than to keep themselves afloat till they find themselves in a favourable situation for fixing and assuming the perfect state.”—Edin. New Phil. Journ. iii. 117.

“from their moving, irritable, and free condition of animalcules, to that of fixed and almost inert zoophytes, exhibits a new metamorphosis in the animal kingdom, not less remarkable than that of many reptiles from their first aquatic condition, or that of insects from their larva state.” One purpose of this mobility in the ova is obvious ;—it is a means ordained for their diffusion, for the parents being fixed immoveably to one spot, the reproductive germs would have dropt and sprung up at their roots, had they not, by some such mechanism as we have described, been carried to a distance, and spread over the bosom of the deep.

The evolution of the gemmules, subsequent to their fixation, has been minutely traced by Professor Grant and Mr Dalyell. When the bud falls from the crested head of *Tubularia indivisa*, slight prominences, enlarged at the tips, pullulate from the under surface, and the “nascent animal” elevating itself on these rudiments of the tentacula, as on so many feet, enjoys the faculty of locomotion. “Apparently selecting a site, it reverses itself to the natural position with the tentacula upwards, and is then rooted permanently by a prominence, which is the incipient stalk, originating from the under part of the head. Gradual elongation of the stalk, afterwards continues to raise the head, and the formation of the zoophyte is perfected.”*—So the worm-like embryo of the vesiculiferous *Hydroida*, a few days after its exclusion from the vesicle, becomes stationary and contracts into a circular or spherical spot which always retains its original colour. It is transparent and soft, but in a short time some opaque fleshy spots are visible within it, and are separated by a thin homogeneous transparent substance, which is to form the future polypidom. “As yet it is exceedingly minute, soft, and gelatinous ; but in the progress of its growth, the soft, thin, homogeneous substance of the exterior becomes more dense, embracing the first formed parts of the fleshy substance, indeed all parts, and the whole jelly, with its thin covering, and continues to advance and to radiate. Then we observe a stem beginning to rise from the centre of these radii of roots, which are, in fact, the first formed parts that the little round gemmule shoots out. So that the gemmule is become, not a polypus but a root. It begins then to rise from the centre of the roots, and at length to divide ; so it will at length form on its branches a cell, at the bottom of which cell will gradually be developed a polypus.”† In the *Flustra* and other ascidian zoophytes the process is very similar, but in these, instead of the rootlets and little embryo stalk, a cell is the part first formed, in which a po-

* Dalyell, in *Edin. New Phil. Journ.* xvii. 412.

† Grant, in the *Lancet*, 1834, Vol. i. p. 229.

type quickly and almost coetaneously develops itself ; and this original cell and polypus is as large, as perfect, as fit for every purpose to which it is destined as any of those which are in rapid succession evolved from its sides and apex, for age adds only to the number of individuals in the polypidom, and nothing to their perfection.

ADDITIONAL NOTES.

1. *Raspail's Description of the Structure of Polypes.*

" I have pointed out that the polypus is nothing but the continuation of its case, which becomes bony or cartilaginous in the lower part, in proportion as the upper part is developed. Consequently its tube, or rather its involucrum, instead of being a shapeless transudation from its body, is formed by successive additions of epidermoid membranes applied over each other in proportion as they are successively ossified. I have pointed out also that these polypi are merely microscopic fixed *Cephalopodes*, having, like the large species of this genus, a bag which is contained within the tube, an excrementitial funnel, ovaries, an intestinal canal with similar curvatures, and a head with all its accessories equally corresponding ; so that, if the *Sepia*, for example, instead of having the dorsal part of its large bag ossified, had undergone the same change over the whole external circumference of this organ, and if its base had been fastened by an adhesive substance to a rock, it would have been exactly a gigantic polypus." —New System of Org. Chem. p. 281–2. Obs. The species on which Raspail made these curious observations are not mentioned in the work from which the extract is taken : they seem applicable only to the ascidian polypes.

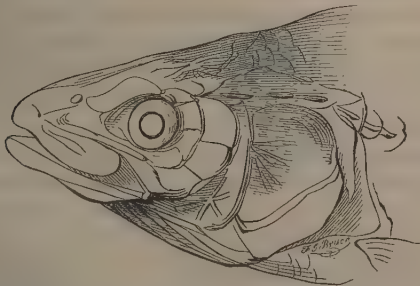
2. *Dr Grant's Account of the Ova of the Flustræ.*

" Although the ova of *Flustræ* have been often observed, no one appears to have hitherto examined either their mode of formation within the cells, or their mode of development after expulsion, so as to determine the real nature of these globular bodies, and the erroneous conjectures of naturalists respecting them have greatly perplexed the history of this genus. The ova of the *F. carbacea* make their first appearance as a small yellow point, a little below the aperture of the cell, and behind the body of the polypus ; they are unconnected with the polypus, and appear to be produced by the posterior wall of the cell, in the same manner as the axis, or common connecting substance of the polypi, produces them in other zoophytes. In this rudimentary state, they are found in the same cells with the healthy polypi, but, before they arrive at maturity, the polypi of such cells perish and disappear, leaving the entire cavity for the development of the ovum. There is never more than one ovum in a cell, and it occupies about a third of the cavity, when full grown and ready to escape. When first visible it has a round or slightly oblong and regular form ; when mature, it is ovate with the small end next the aperture of the cell. The ova do not appear in all the cells at one time, nor is there any discernible order as to the particular cells which produce ova, or the part of the branch which contains them. Cells containing ova are found alike on every part of the branches, from the base to within two or three rows from the apex, occupied only by young polypi. Sometimes we find half a dozen or a dozen of contiguous cells all containing ova, sometimes two or three only ; and often such cells occur singly, at short and

irregular distances from each other. We find the ova in all stages of maturity, on the same branch at the same time; and we seldom observe a specimen of the *F. carbasea*, during the months of February, March, and April, which does not contain numerous ova. The ova have a lively yellow colour; and when they occur abundantly on a specimen or a part of a branch, they cause it to exhibit the same lively hue, which is very different from the dull spotted brown appearance which the branches present at other seasons. Cells are often observed on different parts of the branches, containing neither polypi nor ova; but the fewness of these, and the great number of cells still containing only polypi at the season of generation, render it probable that polypi are regenerated in the empty cells after the escape of the ova. In the empty cells from which the ova have escaped, we frequently observe a few remains of the former polypus, lying at the place where the body of the polypus bifurcated, and where the principal connection seems to exist between the polypus and the axis; we likewise perceive numerous monades and other animalcules busily employed in consuming the remains of the dead polypus. The ovum, even before arriving at maturity, exhibits very obvious signs of irritability, frequently contracting different parts of its surface, and shrinking backward in its cell; the cilia on its surface are likewise observed in rapid motion within the cell, as in the ciliated ova of other zoophytes. The mature ova are often found with their small end projecting from the opening of the cells, and their final escape is aided by the incessant vibrations of the cilia covering their surface, by the ova contracting themselves in their lateral direction, by the waves agitating the branches of the flustra, and by the same incomprehensible laws which regulate the formation and growth of the ova, and the whole economy of this zoophyte."—Edin. New. Phil. Journ. iii. 116-7.

(To be continued.)

III.—On the Pollan (*Coregonus pollan*, Thompson,) of Lough Neagh. By WILLIAM THOMPSON, Esq., Vice-President of the Natural History Society of Belfast.



"In September last a comparison of the Lough Neagh *Coregonus* with the *Vendace* of Lochmaben, (whence I procured specimens

through the kindness of Sir William Jardine, Bart.) proved to me that these species are distinct. The disagreement of the former with the *Gwyniad* or *Coregonus* of Wales, as described by Pennant, was at the same time very obvious; and from the examination of an individual of the latter species, (lately favoured me by Mr Yarrell,) and specimens of the Lough Neagh fish, I am fully satisfied that they are specifically different.

“ From the *Gwyniad*, the Pollan or Lough Neagh *Coregonus* differs—in the snout not being produced; in the scales of the lateral line; in having fewer rays in the anal fin, and in its position being rather more distant from the tail; in the dorsal, anal, and caudal fins, being of less dimensions; and in the third ray of the pectoral fin being longest, the first being of the greatest length in the *Gwyniad*.

“ From the Pollan, the Vendace or Lochmaben *Coregonus* differs so essentially in its lower jaw being the longer, as well as in its being turned upwards, as to render further comparison unnecessary.

“ The pollan is very uniform in size, its ordinary length being about 10 inches; none that I have ever seen exceeded 12. The relative length of the head to that of the body is as 1 to about $3\frac{1}{2}$; the depth of the body equal to the length of the head; the jaws equal, both occasionally furnished with a few delicate teeth; the tongue with many teeth: the lateral line sloping downwards for a short way from the *operculum*, and thence passing straight to the tail; nine rows of scales from the dorsal fin to the lateral line, and the same number thence to the ventral fin; the row of scales on the back, and that of the lateral line not reckoned: the third ray of the pectoral fin the longest.

D. 2+12. P. 16. V. 1 11. A. 2+11. C. 19. B. 9. *Vertebrae* 59.

“ Colour to the lateral line dark blue, thence to the belly silvery; dorsal, anal, and caudal fins towards the extremity tinged with black; pectoral and ventral fins of crystalline transparency, excepting at their extremities, which are faintly dotted with black. Irides silvery, pupil black.

“ As not one of the *Coregoni*, of which I can find descriptions, agrees with the Lough Neagh species, I am induced to consider it as new, and venture to propose for it the name of *Coregonus pollan*,*

* Although the pollan accords not with any *Coregonus* yet described, it was with much hesitation that I bestowed on it a new name, being fully aware that the same species is often very differently described by different authors, and under the impression that it may eventually prove identical with some of the continental *Coregoni*, with which I had not the opportunity of comparing it,—the ac-

as by this trivial appellation it is invariably known in its native district.”*

The above description of the Pollan was read before the Zoological Society of London on the 9th of June last. The following particulars I then looked forward to publish in a paper on the fishes generally that inhabit Lough Neagh, but, until this can appear, the present contribution towards the history of a species which is certainly distinct from the Gwyniad and Vendace, (the only other *Coregoni* known with certainty as British at the present time) may even, in this incomplete state, possess some interest.

The earliest notice of the species that I have seen is in Harris's history of the county of Down, published in the year 1744, where, as well as in the Statistical surveys of the counties of Armagh and Antrim, it has subsequently been introduced as one of the fishes of Lough Neagh, under the name of Pollan; but, as may be expected in works of this nature, little more than its mere existence is mentioned.†

The habits of this fish do not, with the exception of its having been in some instances taken with the artificial fly, differ in any marked respect from those of the vendace and gwyniad, and are in accordance with such species of continental Europe as are confined to inland waters, and of whose history we have been so fully informed by Bloch. The pollan approaches the shore in large shoals not only during spring and summer, but when the autumn is far advanced. The usual time of fishing for it is in the afternoon, the boats returning the same evening. On the days of the 23d, 24th, and 25th of September 1834, which I spent in visiting the fishing stations at Lough Neagh, it was, along with the common and great lake trout, (*Salmo fario* and *S. ferox*,) caught plentifully in sweep-nets, cast at a very short distance from the shore. About a fortnight before this time, or in the first week of September, the greatest take of the pollan ever recollected occurred at the bar-mouth, where the river Six-mile-water enters the lake. At either three or four draughts of the net, 140 hundreds (123 individuals to the hundred) or 17220 fish were taken; at one draught more were captured than the boat could with safety hold, and they had consequently to be emptied on the neigh-

tual examination of specimens being the only true criterion by which to judge of such closely allied species as this genus presents.

* Proceedings of the Zoological Society of London for 1835, p. 77.

† In Harris's "Down," and Coote's "Armagh," it is supposed to be the same as the *shad*. In Dubourdieu's "Antrim," the scientific appellation of *Salmo lavaretus* is given in addition to its provincial name.

bouring pier. They altogether filled five one-horse carts, and were sold on the spot at the rate of 3s. 4d. a hundred, producing L. 23, 6s. 8d. From 3s. 4d. to 4s. a hundred, has been the ordinary price this season at the lake side, or directly from the fishermen; some years ago, it was so low as 1s. 8d. a hundred, but at that time the regular system of carriage to a distance, as now adopted, did not exist. At the former rates, they are purchased by carriers, who convey them for sale to the more populous parts of the neighbouring country, and to the towns within a limited distance of the lake. They are brought in quantities to Belfast, and when the supply is good, the cry of "fresh pollan" prevails even to a greater extent than that of "fresh herring," though both fishes are in season at the same period of the year. In the month of June 1834, 50 hundreds (61500 individuals) of pollans and 125lbs. weight of trout were taken at one draught of a net, at another part of the lake, near Ram's island, which was the most successful capture made there for twenty-four years. In 1834, this fish was more abundant than ever before known. Like the gwyniad and vendace, the pollan dies very soon after being taken from the water,* and likewise keeps for a very short time. It is not in general estimation for the table, but is, I think, a very good and well-flavoured fish.

Though permanently resident, the pollan is very far from being generally diffused throughout Long Neagh, and, unlike the herring, shows but little caprice in the parts of the shore it periodically approaches, rarely appearing in places bordering its chief haunt, and which offer to our view in every respect a similar character. An example of this is afforded by a comparison of the beach, between the river Mayola and Toome, where it rarely occurs, and that from the Six-mile-water to Shane's Castle, its favourite resort. A few houses contiguous to the latter locality were, so long as they existed, dignified with the name of Pollan's Town; but within the last few years, they have been pulled down to make way for "the park's extended bounds."†

In the months of November and December, this fish deposits its spawn where the lake presents a hard or rocky bottom. On the 4th of December 1835, a quantity of the largest pollans I have seen were brought to Belfast market. Several which I obtained for ex-

* Pennant states this of the gwyniad, and Sir William Jardine of the vendace, (Edin. Journ. of Nat. and Geog. Science,) Dr Knox, however, says, of the latter species, "that they live as long as most fishes on being removed from the water."—Trans. Roy. Soc. of Edin. Vol. xii. p. 505.

† Shane's Castle Park, the seat of Earl O'Neill.

amination were 13 inches in length, and all on dissection proved to be females. Most of them were in full roe, (the ova from $\frac{1}{10}$ th to $\frac{1}{8}$ th of an inch in diameter,) but some had partly shed it; one of the former was in total weight $9\frac{1}{2}$ oz. the roe alone weighing $2\frac{5}{8}$ oz. In the others, the proportion of roe was similar. On the 11th of the same month, several male specimens of full size that I procured, and which contained milt most prominently developed, measured but $11\frac{1}{2}$ inches. Thus showing, that in maturity the female fish exceeds the male in length, in the proportion of 13 to $11\frac{1}{2}$. Its average weight when in season is about 6 oz. One specimen, mentioned to me as the largest taken within the last ten years, weighed $2\frac{1}{2}$ lbs. The only food that I have, without resorting to the microscope, detected in the stomach of the pollan was a full grown specimen of the bivalve shell *Pisidium pulchellum*. A pebble of equal size was also found along with it. In one which I had the pleasure of sending to Mr Yarrell, he met with a species of *Gammarus*.* (Yarr. Brit. Fishes, Vol. ii. p. 88.)

The *Buddagh*, or great lake trout, is occasionally taken in night lines baited with the Pollan; for which purpose the perch, divested of its spinous dorsal fin, is also used. The lesser black-backed gull (*Larus fuscus*, Linn,) which frequents the lake in considerable numbers, is, in consequence of being believed to subsist on this fish, called there commonly by the name of Pollan Gull.

As yet the Pollan is known to me only as inhabiting Lough Neagh. In Harris's "Down" (p. 238,) it is stated, "that Lough Earn, in the county of Fermanagh, has the same sort of fish, though not in so great plenty." This is probably correct, as Lough Erne is of very considerable extent, ranking amongst the lakes of Ireland as the second in size; being inferior only to Lough Neagh.

IV.—*Descriptions of some new species of Exotic Coleopterous Insects from the Collection of Sir Patrick Walker.* By J. O. WESTWOOD, F. L. S., &c.—Plate VII.

Order—COLEOPTERA.

Section—PENTAMERA, (GEODEPHAGA ADEPHAGA.)

Fam.—CICINDELIDÆ.

DISTIPSIDERA, genus novum.

Corpus elongatum, abdomen capite cum oculis vix latius: caput

* June 10, 1836. On opening the stomachs of six pollans, I found them all filled with food, consisting chiefly of mature individuals of *Gammarus aquaticus*, and the larvæ of various aquatic insects; some shells of the genus *Pisidium*, one of the fry of the three-spined stickleback (*Gasterosteus*), and a few fragments of stone also occurred.—W. T.

magnum, subovatum, transverse et irregulariter rugosum : *oculi* magni, valde prominuli : *antennæ* quam caput et thorax vix longiores, graciles, versus apices paulo crassiores, articulo 1mo crasso, subcurvato ; 2do minuto ; 3tio omnium longissimo, curvato, ad apicem crassiori ; reliquis 8vis longitudine fere æqualibus, at sensim paulo crassioribus : *labrum* maximum, mandibulas obtegens, oblongo-ovatum, antice emarginatum, dente parvo in parte centrali emarginato, dentibusque quatuor magnis lateralibus setis paucis elongatis submarginalibus instructum : *mandibulæ* validæ, curvatæ, ad apices acutæ, dentibus duobus internis prope medium armatæ, aliisque duobus basalibus : *maxillæ* elongatæ, intus valde setosæ, apicibus unco mobili armatæ, palpi externi breves, 4-articulati, articulo 1mo brevissimo, 2do crassiori, reliquis duobus gracilibus, ultimo ad apicem paulo crassiori, subtruncato : *palpi interni* gracillimi, 2-articulati : *mentum* brevissimum, transversum, lobis duobus magnis lateralibus, et in medio, dente vix conspicuo armatum : *labium* (seu *ligula*) omnino occultum : *palpi* breves, 4-articulati ; articulo 2do brevissimo ultra marginem anticum labrorum lateralium haud protruso ; 3tio maximo valde inflato, et lateraliter setis rigidis erectis armato ; 4to, 1mo longitudine equante, gracili, lævi : *thorax* capitis (absque labro) longitudine, antice et postice constrictus, medio convexus, lateribus rotundatis : *elytra* oblonga, subparallela, thorace latiora, rugosa, rugis postice transverse coalitis : *pedes* elongati, tarsi antici (in individuo viso) simplices.

This new genus exhibits the characters of several of the groups of Cicindelidæ. From Cicindela it is distinguished by the large size of the labrum, the unarmed mentum, the large labial palpi, the short antennæ, &c. The same characters also remove it from Odon-tocheila Laporti, of which it has considerably the external habit, but a different thorax. From Therates, which it also much resembles, it is removed by the large labial palpi, simple fourth joint of the tarsi, and by having an internal maxillary palpus. From Dromica its peculiar form and labrum remove it. It appears most nearly allied to Euprosopus and Iresia, agreeing with the former in the structure of the labial palpi, but differing in the labrum and mentum, and resembling Iresia in the form of the body, and in the peculiar style of punctation on the elytra, but having very different palpi.

Sp. 1. DISTIPSIDERA UNDULATA. Fig. 1.

Subcupreo-nigro, labio luteo lateribus nigris, elytrorum humeris et apicibus, fasciis duabus undulatis in medio interruptis, albidis.

Long. corp. lin. $7\frac{1}{2}$.—Habitat in Nova Hollandia ?

In Musæo P. Walkeri, Eq.

Nigra, æneo et cupreo perparum tincta : *caput* magnum, impressione verticali in qua linea transverse elevata irregulariter striatum striis gracilibus, cum oculis parallelis, at versus verticem conjunctis, et quasi circulos irregulares efformantibus : *labrum* luteum, lateribus nigris : *antennæ* nigræ, articulis apicalibus brunneis : *mandibulæ* luteæ, dentibus nigris : *maxillæ* fuscæ, dentibus rufis, palpis nigris : *mentum* nigrum, palpis albidis, apicibus articuli 3tii 4tisque nigris : *thorax* cum capite concolor, transverse striatus et punctatus : *elytra* ejusdem coloris, apices versus paulo magis cuprea, magis rude punctata, punctis ultra medium elytrorum in striis transversis, confluentibus, ad humeros macula parva albida, et cum fascia 1ma undulata, et in medio interrupta convexa ; fascia 2da ejusdem coloris, paulo pone medium elytrorum ad latera dilatata, at versus discum tenuior et angulata, at in medio interrupta, denique macula apicalis triangularis ejusdem coloris : *pedes* nigri, trochanteribus apicibusque femorum 4 anticorum et femorum posticorum, basi luteis.

Obs.—The details are lettered alike throughout with the initials of their respective names, *h*, head ; *a*, antennæ ; *m*, mandibles ; *mx*, maxillæ ; *m, p*, maxillary palpus ; *l*, 1, upper lip (labrum ;) *l*, 2, under lip (labium ;) *cl*, clypeus ; *ch*, chin (mentum ;) *l, p*, labial palpi ; *sc*, scutellum ; *t*, tarsus ; *f*. 1. 2. 3. 1st, 2d, or 3d leg ; (*T.*) 1, prosternum. A fixed series of names of this kind would be very serviceable, and far more easy than the kind of references adopted by Savigny.

(MACROSTERNI.) *Fam.*—BUPRESTIDÆ.

BUPRESTIS DECIPIENS. (Fig. 2.)

Læte fulva, opaca, maculâ frontali, lineâ thoracis mediâ, alterisque duabus lineatis lateralibus, elytrorum apice, antennis et pedibus nigro-cæruleis, metasterno et abdomine viridi-cæruleis nitidissimis.

Long. corp. lin. $7\frac{1}{2}$, lat. elytr. lin. 3.—Habitat in Nova Hollandia.

In Musæo Patr. Walkeri, Eq.

Testaceo, fulva-opaca, thorace subnitido : *caput* fulvum, macula parva frontali, alterisque duabus minutis versus basin antennarum apiceque clypei nigris, linea tenui impressa inter oculos, oculis magnis lateralibus, capite ante oculos in rostrum parvum productum : *mandibulæ* parvæ, triangulares, dente parvo acuto terminali, alteroque interno, armatæ : *maxillæ* graciles, bilobatæ, lobis pilosis, interno parvo : *palpis* maxillaribus, lobo externo haud longioribus, 4-ar-

ticulatis, filiformibus, articulo 1mo minuto vix distinguendo; 2do reliquis longiori, duobus ultimis parvis subæqualibus: *labrum* transverse subquadratum, margine antico ciliato fere recto: *mentum* punctatum, transversum, antice truncatum, lateribus rotundatis, membranâ transversâ antice instructum: *labium* porrectum, membranaceum, ciliatum, palpis labialibus brevibus, filiformibus, articulis 3tiis subæqualibus: *antennæ* cyaneæ, articulo 2do minori, 3tio et 4to oblongis, 4to obtrigono, reliquis acute et interne productis: *thorax* (seu *pronotum*) transverso-quadratus, antice quam postice paulo angustior, lateribus rotundatis, margineque postico trilobato, testaceus, punctatus, linea longitudinali dorsali, maculisque duobus lunatis, lateribus cyaneo-nigris: *scutellum* parvum, transverse cordatum: *elytra* elongata, parallela, thorace latiora, costata, et pone media paulo dilatata, lobo utrinque in partem thoracis postice inciso porrecto, munito e quo costæ tres producuntur, costis duobus alteris lateralibus; punctatissima et lineis 8 punctorum majorum, costas marginantibus elytrorum, apex fere rotundatus, dente parvo, utrinque versus suturam, et coloris cyanei, qui in suturæ dimidium extenditur: *pedes* graciles, nigro-cyanei, femoribus anticis in medio fulvis, tarsis dilatatis, articulo 4to cordato, et articulum ultimum versus basin ejus emittenti: prothorax subtus fulvus, in medio complanatus, et in metasterno (antice bifido,) postice receptus; mesosternum, metasternum, coxa postice et abdomen viridi cærulea, nitidissima punctata, abdomen 5-articulatum, articulis transversis fere æqualibus, ungues simplices versus basin, subtus paulo angulati.

The appearance of this beautiful species of *Bupestris* does not at all coincide with that of the family to which it belongs, its opaque costated elytra, rich fulvous colour and pectinated antennæ, giving to it much more the character of an *Elater* or *Lycus*.

The characters upon which the recently established genera of this family have been constructed, are in many cases so slight, that I cannot ascertain to which of them the insect in question belongs; indeed, I should rather suppose that it will constitute a distinct form in the family.

The presence of a scutellum places this insect in Solier's second division. From *Chalcophora* *Bupestris* and *Polycesta* it differs in the posteriorly lobed thorax, and hence it must belong to the second subdivision, approaching nearest to *Colobogaster*, *Sphenoptera*, and *Pæcilonota*, but differing from all these in various parts of the mouth.

(APROSTERNI.) Fam.—CEBRIONIDÆ.

CLADOTOMA, genus novum.

Corpus ovatum, subsericeum: *caput* parvum, deflexum, sub tho-

racis marginem anticum productum fere absconditum: *oculi* magni, laterales: *antennæ* 11-articulatæ, corporis fere longitudine, inter partem inferiorem oculorum insertæ, articulo 1mo ovali; 2do minuto; 8vis proximis, ramum elongatum, compressum, singulatim emittentibus; 11mo elongato, compresso: *labrum* parvum, transversum, angulis anticis lateralibus rotundatis, lobo minuto, triangulari, membranaceo, in medio instructum: *mandibulæ* validæ, corneæ, acutæ, curvatæ, dente acuto infra apicem internum; extus pilosis: *maxillæ* membranaceæ, lobis duobus instructæ, lobo externo magno, et in quatuor filamenta pilosa et in longitudine decrescentia diviso, lobo interno gracili piloso, setisque decumbentibus, in medio induto: *palpi* maxillares, breves, crassi, 4-articulati, pilosi, articulo 1mo brevi, 2do et 4to ejusdem longitudinis, hoc elongato-ovato, apice subtruncato: *mentum* brevissimum, coriaceum, labrum in filamentis 4 gracilibus, quorum intermedia longiora et pilosa, divisum; palpi labiales breves, crassi, 4 articulati, articulo 2do brevissimo; 3tio et 4to subæqualibus, hoc elongato, apice subtruncato: *thorax* semicircularis, margine antico deflexo, et supra caput quasi cucullato; angulis posticis subacutis, et ad basin elytrorum arcte applicatis, margineque postico in medio paulo producto: *elytra* oblongo-ovalia, convexa; scutellum parvum, subrotundatum: *prosternum* simplex, inter pedes anticos haud protrusum, pedes breves, graciles, tarsis 5-articulatis, articulo 3tio bilobo, 4to minutissimo versus basin articuli præcedentis insito, 5to elongato, pulvillis nullis.

This is a very interesting genus, which, if we were to admit the tarsal system in an unlimited manner as our guide in the distribution of the Coleoptera, it would be necessary to place in the section Tetramera, with some species of which, as the Galerucidæ, it has indeed considerable analogy. Its chief affinity is however, *Atopa*, with which it agrees in several particulars, but the structure of the tarsi and antennæ remove it from that genus, and indeed from the little group in which *Atopa* is placed by M. le Comte de Castelnau in his Memoir upon the Rhipiceridæ, in which he has given the character of antennæ not branched as that of the *Atopæ*. The structure of the lower jaws and lower lip is very beautiful, and Mr Curtis has represented a somewhat similar structure in *Atopa*, whilst De Geer has figured the maxillæ of *Leptura* 4-fasciata, (Mémoires, Vol. v. pl. 4, fig. 13,) which very closely resembles that of *Cladotoma*, and which De Geer considers serviceable in collecting the honey of flowers.

Sp. 1. CLADOTOMA OVALIS. (Fig. 3.)

Fusca, elytris fulvis, basi et thorace obscurioribus, sutura albida.

Long. corp. lin. 6.—Habitat in Brasilia.

In Musæo P. Walkeri, Eq.

Ovalis, fusca, tenuissime punctato, sericie grisea induta: *caput* cum oculis nigrum, mandibulæ ad apices nigrae, antennæ fusca, ramis fulvis: *thorax* fuscus, subnitidus margine antico et postico (in medio) fulvo, scutellum et sutura elytrorum albidis: *elytra* subelevata convexa, lineis nonnullis longitudinalibus, fulva versus basin, obscuriora marginibus lateralibus, sericie alibicantibus: *pedes* fusci, sericii, corpus subtus fuscum griseo-sericeum.

(LAMELLICORNES.) Fam.—SCARABÆIDÆ.

HYBOMA CARINATA. Fig. 4.

Nigra, obscura, thorace in medio valde elevato bicarinato, elytris in mediis et versus apices tuberculis acutis curvatis instructis.

Long. corp. Lin. 7.—Habitat. in America Meridionali.

In Musæo Patr. Walkeri, Eq.

Nigra subopaca, sub lente fortissimo punctis circularibus undique notata: *caput* magnum, planum, deflexum antice, lobo parvo centrali bifido armatum, et ad latera ante oculos utrinque incisum: *oculi* lunati, (seu potius margine laterali capitis antice intranti:) *antennæ* fusca, 9-articulata: *thorax* magnus, ad latera angulatus, dorsoque valde elevato et bicarnato, carinis postice connexis, scutellum obsoletum: *elytra* planiuscula subquadrata, pone medium paulo dilatata, disco subundulato, carina elevata, acuta, humerali, tuberculisque duobus centralibus, curvatis et acutis in singulo, alterisque quatuor in singulo versus apicem formæ ejusdem, margo lateralis inflexus: *pygidium* nudum deflexum: *pedes* graciles, intermedii ad basin valde remoti, tibiæ anticæ marginibus externis serratis, et ad apicem 3-dentatæ, tarsi antici, minutissimi sed distinctè 5-articulati, tibiæ intermediæ 2-calcaratæ, postice longiores curvati, 1-calcaratæ simplices, tarsis ad apicem tibiæ insertis.

Fam.—GEOTRUPIDÆ.

GEOTRUPES LETHROIDES. (Fig. 5.)

G. niger, latissimus, capitis cornu erecto, thorace impressione magno antico, posticè elevato, elytris semiglobosis.

Long. corp. lin. $9\frac{1}{2}$, lat. lin. 6.—Habitat in America Meridionali.

In Musæo Patr. Walkeri, Eq.

Niger, subopacus, et sub lente forti tuberculis minutissimis undique obtectus: *caput* transversum, clypei margine antico rotundato, in medio cornu brevi erecto armatum: *labrum* transversum, membranaceo-marginatum, setosum, mandibulæ oblongæ, extus obtuse

cornuto, et ad apicem dentibus duobus acutis, alteroque infero truncato, armatæ, intus ciliatæ: *maxillæ* et organa labialia ut in Geotrupidibus typicalibus: *antennæ* longiores, 11-articulatæ, articulis 2, 3, 4, subæqualibus: *thorax* magnus, transversus, lateraliter et postice elevatus, depressione magna subrotundata, partem anticam thoracis occupanti, in qua ad marginem anticum, tuberculum parvum longitudinale exstat; margo ipsius partis depressus ad latera, subacutus, postice vero depressus; angulis posticis thoracis productis subacutis: *elytra* semiglobosa, valde convexa, nec striata nec oculo nudo punctata, tenue marginata: *pedes* robusti, tibiis anticis 6-dentata.

The remarkable outline of this insect, with its dentate mandible, subelongated antennæ, carinated head, singularly depressed thorax, and smooth gibbous elytra, seem to be characters of higher value than those indicating a species. I have not, however, ventured to separate it generically from Geotrupes, but have figured the essential organs for comparison. *G. latus* of Leach, figured by Sturm in his Catalogue, and said by Dejean to be from Barbary, seems to be allied to this species, but wants the remarkable characters exhibited by the head and thorax of *G. lethroides*.

V.—On the Comparative Elevation of Testacea in the Alps. By
EDWARD FORBES.

THE influence of elevation on the distribution of plants is at present a popular theme with the botanist, whilst the same influence on that of animals is comparatively neglected, though (among the invertebral tribes particularly) many important results may be expected from researches on that subject. The following data, though few, may yet have their use in showing how far such an influence affects the species of shell-bearing mollusca. The stations at which the observations were made are the Pass of the Gemmi, and the mountain of Faulhorn in the Swiss Alps, during the month of July 1835. The highest part of the Gemmi is that beside the Dauben-see, marked by Keller at 6360 feet. The summit of the Faulhorn is 8200 feet above the sea-level. In the absence of accurate measurements, I have marked the distribution by the characteristic plants of the elevations at which the species were found.

I. The highest Testacea occurred at the edges of glacial masses by the Dauben-see, and on the Faulhorn at about 7000 feet. Vegetation that of "the Glacial Zone:" *Soldanella alpina* and *minima*, &c.

VITRINA, nov. sp. *V. glacialis*, Mihi.

Testa hyalina, supra plana, spiris duobus; apertura patentissima, ovato-oblonga. Long. $\frac{1}{3}$ poll. Lat. $\frac{1}{8}$. Animal nigrum; capite, caudâ, tentaculisque obtusis.



I found this beautiful and very distinct species of *Vitrina* in considerable plenty under stones on the high elevations referred to, and only there. Ferrussac figures two alpine species, the *V. annulata*, "Venetz," and the *V. pyrenaica*, both of which appear to be varieties of *V. pellucida*, and far removed from the *V. glacialis*, the nearest ally of which is perhaps the *V. elongata* of Draparnaud: but the animal of *V. elongata* is grayish-white, a distinction sufficiently specific, independent of the comparative characters of the shells. The *V. glacialis* seems to have escaped the observation of the Swiss conchologists Thomas and Studer, neither of whom refer to any other species in their catalogues, besides *V. pellucida* and *V. elongata*. Few indeed would think of searching for shells in such an icy habitat as that of the *V. glacialis*.

Helix arbutorum, var. *alpina*, Ferr.

This dwarf variety is found abundantly at about the same elevation with the *Vitrina*, and ceases in the following zone.

II. At Swaribach on the Gemmi and similar elevations, never very close to the snow masses. Plants—*Nigritella angustifolia*, *Polygala chamaebuxus*, &c.

Bulimus (*Cionella*) *lubrica*, var. *alpina*.

A very pretty and curious variety of this species, distinguished from the normal form by its dwarf size, more contracted mouth, and whitish colour.

Pupa secale, Drap.

—— cylindrica, Ferr.

—— marginata, Drap.

Clausilia with the shell tapering, almost smooth: mouth with a single primary tooth and an obsolete secondary fold. Var. of *C. minima*, Pfeiffer?

Helix rupestris, Drap.

—— crystallina, Drap.

—— trochilus, Mont. (*fulva*, Mull.)

—— nitida, Mull.

In springs on the Faulhorn at the same elevation I found *Lymnæa fossaria*, β . *minuta*, Drap. an *Cyclas* (*Pisidium*) *obtusale*, Pfeiff?

III. The dwarf pines appear. All the species mentioned under II. are found in this and the following zone, with the exception of

the alpine form of *Bulimus lubricus* and the *Clausilia* above-mentioned.

Helix hispida, β , (an *Helix concinna*, Ferr ?)

—— *rotundata*, Mull. (*radiata*, Mont.)

IV. The following species were plentiful in the first pine forests :

Helix villosa, Drap.

—— *pomatia*, Lin.

—— *personata*, Drap.

—— *obvoluta*, Mull.

Clausilia bidens, Dr.

—— *rugosa*, Dr.

—— *perversa*, Pfeiff.

—— *solida*, Drap.

Bulimus montanus, Drap.

—— (*cionella*) *lubrica*, Mull.

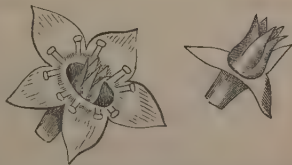
In the lowlands of Berne the Testacea are those of the north of Europe and Germany, but in the Vallais the conchology assumes a more southern character. The trunks of the chestnut trees about Sion are often covered with the *Helix sylvatica*, Drap. and under stones we find *Bulimus radiatus*, *Pupa quadridentata*, and *Pomatias maculata*.

VI.—On the Structure of the Flowers of *Adoxa moschatellina*. By the Rev. J. S. HENSLOW, M. A. Professor of Botany in the University of Cambridge.

THE flower of *Adoxa moschatellina*, as is well known, are arranged in a head, and are so placed that one is terminal, and four others lateral. They are composed of four whorls; but the number of the parts in each is usually different in the terminal and in the lateral flowers. In speaking of the subordinate parts of the two outer whorls we shall consider them as sepals and petals, which cohere to form a gamosepalous calyx and gamopetalous corolla. In this sense then,

the terminal flower more usually contains 2 sepals, 4 petals, 8 stamens, and a 4-celled ovarium, which may be considered as compounded of 4 carpels, while the lateral flowers contain 3 sepals, 5 petals, 10 stamens, and 5 carpels (Fig. 1.) Such is the ordinary

Fig. 1.



view taken of the structure of these flowers. They are, however, very subject to vary in the number of their parts, and we propose to examine each whorl in detail.

1. *The calyx.* This whorl varies both in the terminal and lateral flowers, with 2, 3, or 4 sepals. In the latter case 3 of the sepals were observed to alternate with 4 petals, and the fourth sepal to be opposite a fifth petal.

De Candolle does not consider this whorl as a true calyx, but calls the corolla a calyx. This reduces the sepals to bractæ, and as these are combined, the whorl must be considered as an involucre. In this case we have the tube of the involucre combining with the lower half of the ovarium, and also uniting with the calyx and stamens. There seems to be no sufficient reason for admitting such an anomaly, and the view usually taken appears to be preferable.

2. *The Corolla.* This is always composed of either 4 or 5 petals, which cohere by their bases and to the upper edge of the calyx, where it becomes free from the ovarium. Some of the petals are sometimes opposite and sometimes alternate with the sepals, which they exceed in number by 1, 2, or 3 parts.

3. *The Stamens.* These are placed very evidently in pairs, a single stamen of each pair standing on either side of the sinus formed by the union of two contiguous petals.

De Candolle asserts that half are opposite, and half alternate, with the petals. This view must be ascribed to a desire to obviate the apparent anomaly of their being neither opposite nor strictly alternate with the petals, but it is decidedly inadmissible. He has not observed that

the anthers consist of a single lobe, nor can I discover that this fact has been previously noticed by any author except Dr Hooker, who in his *Flora Scotica* has the following remark: "Stamens united in pairs, or they may be considered as 4 or 5 forked stamens, each ramification terminated by a single cell of an anther, and all springing from a fleshy ring that surrounds the germen."

I was ignorant of this observation, but was led to make the same remark last spring, by reflecting in

what way it would be possible to reduce the anomalous structure of this flower to some normal condition, in which the parts of the several whorls would be arranged agreeably to the

generally established rules of morphology. De Candolle's view appeared to be quite untenable. Upon examining a great number of specimens, I observed in many instances a very decided tendency

Fig. 2.



Fig. 3.



in the filaments to combine in pairs. Following up the hint which was thus afforded, I found that the anthers were composed of a single cell; and that it was in those cases only where two contiguous filaments had become completely united, that we ever have a perfect stamen crowned by a two-lobed anther. This at once solved the difficulty, and reduced the structure of the flower within the usual conditions. Dr Hooker has not decided which structure should be adopted, and has followed the arrangement generally adopted of classing this plant under Octandria. The fact of the frequent coherence of the filaments in the contiguous stamens, combined with the regularity thus introduced into the arrangement of the several parts of the contiguous whorls, singularly strengthens the conjecture he had hazarded from the consideration of the anthers being one-celled, and may indeed be considered as affording as direct a proof of the normal condition of this flower as the subject will admit. It may therefore be stated as containing 4 whorls of 5 parts each, the parts alternating in the successive whorls,—a structure eminently characteristic of a dicotyledonous plant, and probably exhibited in greater perfection in the genus *Crassula* than in any other. In the present case, the deviation from the normal character in the lateral flowers consists in the ordinary suppression of 2 or 3 parts in the calyx, sometimes of 1 only; and in the terminal flower in the suppression of one part in all the whorls as they are usually exhibited in the lateral flowers.

Among the numerous specimens which I examined, some had the stamens partially converted to leaves; two small ones being placed facing each other and occupying their usual position on the corolla. (Fig. 4.) In some cases a supernumerary petal of small dimensions was accompanied by a thick filament bearing a three-lobed anther, a monstrosity which apparently originated in a complete and supernumerary stamen having been also developed, and united with the half stamen to which it was contiguous. In other cases, the contiguous filaments were united, and one part foliaceous, the other antheriferous, recalling the structure of the stamens in a *Canna*.

Fig. 4



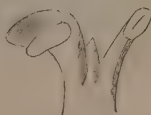
Fig. 5.



Fig. 6.



Fig. 7.



REVIEWS AND CRITICAL ANALYSIS.

I.—*Flora Hibernica, comprising the Flowering Plants, Ferns, Characeæ, Musci, Hepaticæ, Lichenes, and Algæ of Ireland, arranged according to the Natural System, with a Synopsis of the Genera according to the Linnæan System.* By JAMES TOWNSEND MACKAY, M. R. I. A. &c. 8vo. Dublin, 1836.

AN Irish Flora has been long felt to be a desideratum. While Great Britain was glutted, as it were, with descriptions of its vegetable productions, no attempt was made even to enumerate the plants of Ireland, until 1824, when the worthy author of the present volume gave to the Royal Irish Academy, his Catalogue of the Phænogamous Plants and Ferns which he had then ascertained to be natives of the country. This catalogue was, he informs us, the result of twenty years observation, and in the preface he announced his intention of extending it into a complete Flora. Such a work has been therefore looked for at his hands, and although it is somewhat of the latest in its appearance, we receive it with a cordial welcome. It seems from a paragraph in the introduction that, “in 1833, a small volume appeared entitled the *Irish Flora*, containing short descriptions of most of the Phænogamous Plants and Ferns of Ireland that were known up to that time.” This work we have never seen.

The *Flora Hibernica* is arranged according to the Natural System, and is divided into three parts; the first containing the flowering plants and ferns; the second, the *Musci*, *Hepaticæ*, and *Lichenes*; and the third, the *Algæ*. In regard to the first part, (which is preceded by a synopsis of the genera according to the Linnæan method,) the best idea we can give of the manner in which it is executed is to say that, with the exception of the arrangement, the whole is constructed on the model of the *British Flora*. We must not be understood as bringing any charge of plagiarism against Mr Mackay, for he candidly informs the reader that his descriptions both of ge-

nera and species, are generally adopted from the *British Flora*, as well as the etymologies of the generic names. We are convinced that the work has not lost any practical value in so excellent a guide having been followed as Sir W. J. Hooker; but at the same time, our friend Mr Mackay will allow us to express a regret that, in the first respectable *Flora* of such a country as Ireland, a little originality should not have been exhibited. We are sorry also not to see a few observations upon the geographical distribution of Irish plants, as compared with England and Scotland; but this most interesting subject will probably increase the value of a second edition at no distant period.*

The plan adopted by the author, of treading for the most part in the steps of Hooker, leaves little scope for critical remarks. He has naturally enough followed the example offered by the *Floras* of England and Scotland, of admitting various doubtful plants into his list; but there are two which we consider as more than usually questionable; viz. *Dianthus plumarius*, and *Lythrum virgatum*. A

* In addition to remarks on the geographical distribution of plants hinted at by our contributor of the above article, we should like to see embodied in a new edition, which we sincerely trust is already called for, a little more distinction, marked either by type or otherwise, between the plants which are really indigenous and those of spurious rank; the localities more decidedly pointed out, and the places of growth stated with more precision, and "with a steady eye to their mineralogical characters,"—and surely it is indispensable to have the provincial names noted in the native Irish. Ireland has ever been to us a favourite country, and we have looked upon it as affording peculiarities remarkably enticing to the faunist or florist. It is of sufficient extent to be itself a province, has variety of hill and dale, of wide-spreading lakes and noble rivers, of waste and woodland, of sea-coast and of alpine ranges. It is separated from its sister isle, (from which the annexed table will show it to vary curiously in its botanical productions,) only by a narrow strait, from the continent of Europe by a wider space, while on another side it is open, and exposed to the storms and surge of the ocean. It would be curious to trace the influence of the nearest lands on its animal productions, and on its flora. The vegetation of the west coast might be contrasted with that of the east and north. The influence which the greater moisture and less severity of her winters had on the habits and physiognomy of the vegetation, or in clothing her hills with mossy and saxifragous plants, might be carefully marked and compared. This, we know, would be a task difficult and tedious, though to some delightful; but the Florist of Ireland, independent of his scientific acquirements, must catch the spirit of the clime; he must learn to love the green isle and its every beauty; he must add some tincture of the poet and a love for the olden time, a taint of the learning and eccentricity of the antiquary;—before commencing he must invoke the manes of Linnæus and of Wahlenberg.

more interesting plant is a curious heath, named by Mr Babington *Erica Mackaiana*. We wish it may be truly distinct, but it is very nearly allied to *E. tetralix*, which it resembles in its flowers and awned anthers, while in its leaves it approaches *E. ciliaris*.* It is found in Cunnamara, the country of *E. Mediterranea*, and *Menziesia polyfolia*. *Saxifraga geum*, δ . of Hooker is raised to the rank of a species, under the name of *S. elegans*; the author states that it has retained its distinctive characters in cultivation since 1807. The Irish whin, *Ulex strictus* of the catalogue of Irish plants, is reduced to a variety of *U. Europæus*; but we confess we are as much in doubt respecting that peculiar-looking plant, as Sir W. J. Hooker, who admits that he is at a loss whether to refer it to *U. Europæus*, or *nanus*, or to consider it as a species. But surely the same scruple need not exist in regard to the Florencecourt yew, the *Taxus fastigiata* of Lindley's Synopsis. Individuals exist in Ireland of fifty years growth. In some few instances Mr Mackay differs from Sir W. J. Hooker; for example, the genus *Conopodium* of Koch is preferred to *Bunium* for the common earth-nut; and *Helosciadium* of Koch adopted by Hooker for *Sium nodiflorum*, *repens* and *innudatum* is rejected. *Calamintha officinalis* is also still included in the genus *Thymus*. He has fallen into the same error as Sir W. J. Hooker in describing *Habenaria chlorantha* both under that name, and also under the denomination of *H. bifolia*, but there is reason to believe that Mr Mackay had not seen the true *H. bifolia* of Linnæus, which is probably not a native of Ireland. The three common *Primulæ* are kept up with an observation that many botanists consider them as only varieties. There seems to be a delicate forbearance exercised by almost all writers of floras towards the "pale primrose," the "freckled cowslip," and their supposed hybrid the oxlip. Linnæus believed them to be the children of one parent. Professor Henslow brought the question to the test of direct experiment, and raised them all from the same root. Hooker observes, "They are rarely found intermixed, and in Scotland the two last kinds (*P. elatior* and *veris*) are scarcely known.† Mr H. F. Talbot found upon the summit of a high mountain near the lake of Thun, in Switzerland, *P. elatior* in abundance, while *P. veris* was confined to the base of the hill, and *P. vulgaris* was not found

* See Mr Babington's characters at page 201.

† This is a mistake as far as regards *P. veris*, which is by no means unfrequent. We have seen whole fields as thickly dotted with cowslips in Scotland as in England.

within fifty miles of it." This is a highly curious fact; but supposing the plants to be varieties, it only proves their characters to be singularly constant. If it is an ascertained fact that they are really varieties, they ought to be acknowledged as such, and a scientific truth recognized. It is very remarkable that *Primula farinosa* has not been found in Ireland.*

The second part of the volume is from the pen of Dr Taylor, the able coadjutor of Professor Hooker in the well-known *Muscologia Britannica*. The acute observer is manifest in every page, but especially in the descriptions of the *Hepaticæ*, which evidently exhibit the result of a long series of observations upon the living plants. A new genus (*Hygrophila*) is established to receive the *Marchantia irrigua* of Wilson † (in Brit. Fl.) and we have two new species of *Jungermannia*; one hitherto confounded with *J. epiphylla*; the other parasitic upon *Hypnum loreum*, and so minute as to be only visible under the microscope. Among the *Musci* we have a recent acquisition (*Gynostomum tortile*, Schw.) a near species of *Glyphomitrium*, and a new species of Bridel's genus *Zygotrichia*. Ireland seems to be exceedingly rich in lichens. Besides a host of species already known as inhabiting the British islands, Dr Taylor has described forty-three new species belonging to various genera, eleven

* There is one other point well worthy of attention,—and yet but slightly noticed in this work,—we mean the *bog-timber* of Ireland, more particularly the pine tribe. Mr Mackay appears to have satisfied himself that not more than one species of pine is found in the bogs, and that that is identical with the *Pinus sylvestris*, for he says under that head, (p. 259) "this tree appears to have been abundant in Ireland, as trunks of very large dimensions are often found in the bogs," and expresses no doubt of their identity with the Scotch fir. Any person reading this observation would suppose that the point was settled, yet, indeed, there still remains great doubts on the subject, for apparently at least two different kinds of deal exist in the bogs. One has a stem spirally twisted in a very marked manner, is very inflammable, gives out a fine perfume when burned, and is used in the place of candles and torches by the peasantry in many parts of the island. One of them also, we believe the latter, has the root far larger in proportion to the timber, than it is found to be in the Scotch fir. It is more than a speculative point to determine the species, for since a fir once grew to a very large size in the wetter of the Irish bogs, it might do so again could we succeed in obtaining the same species of tree; and there is no way to come to the desired information, excepting by a careful and microscopical examination of the structure of every kind of bog-timber.

† Ord. HEPATICÆ. Genus HYGROPHILA.—*Male receptacle* pedunculated, hirsute, with short scattered hairs. *Female receptacle* pedunculated, hirsute, with short scattered hairs. *Calyx* none. *Loculi* univalved, carnose, opening at the top with a vertical short fissure. (Frond without pores.)

known species introduced for the first time into our Flora, besides a new genus called *Syncesia*, constructed to receive a rather obscure plant allied to *Arthonia*.* Dr Taylor has performed his share in the Flora Hibernica admirably; and we are only disposed to complain of his having adhered too rigidly to the genera of Acharius after they have been, by universal consent, more or less modified.

The last division of the work, devoted exclusively to the *Algæ*, has been contributed by Mr Harvey, whose intimate acquaintance with the order is sufficiently shown in Hooker's British Flora. It is a department as full of interest, as the objects themselves are often graceful and beautiful. Mr Harvey has done his part well and carefully. The *Algæ Britannicæ* of Dr Greville has to a considerable extent served him as a guide, and he has adopted verbatim, with due acknowledgement, that author's description of the *Diatomaceæ*, as contributed to the British Flora. But Mr Harvey is no copier,—he plainly investigates and thinks for himself; and his portion of the Flora Hibernica contains much valuable information. All the Irish Algæ he has arranged into three grand divisions, which, from the colour of the seeds, he denominates MELANOSPERMEÆ, RHODOSPERMEÆ, and CHLOROSPERMEÆ. In the first division we find the tribe *Ectocarpeæ* placed between *Dictyotæ* and *Chordarieæ*; and in the second division, *Gloiocladeæ*, the first tribe, containing the genera *Mesogloia*, *Gloiosiphonia* and *Chætospora*, precedes the *Gastrocarpeæ*. Such an arrangement exhibits new and ingenious views respecting the affinities of *Ectospermeæ* and *Gloiocladeæ*.

In order to add some degree of interest to this article, we have drawn up a table, which exhibits at one view the relative Floras of England, Scotland, and Ireland, in regard to the total number of genera and species in each natural order; as well as a list of those British genera in which the Irish Flora is deficient.

* Ord. LICHENES. Genus SYNCESIA.—*Thallus* crustaceous. *Apothecia* oblongo-elongate, stellato-radiata, aggregated and immersed in scattered thallodal verruca. *Perithecium* none. *Lamina prolifera* pellucid, supported on opaque vertical layers.

ORDERS.	England.		Scotland.		Ireland.		British Genera not represented in the Irish Flora.
	Gen.	Sp.	Gen.	Sp.	Gen.	Sp.	
1. Ranunculaceæ,	13	33	10	26	8	24	{ Actæa, Aconitum, Adonis, Pæonia, Delphinium, Myosurus. Epimedium.
2. Berberideæ	2	2	2	2	1	1	
3. Nymphæaceæ,	2	3	2	3	2	2	
4. Papaveraceæ,	4	10	4	6	4	8	
5. Fumariaceæ,	2	6	2	4	2	4	
6. Cruciferae,	30	69	26	62	23	49	{ Teesdalia, Turritis, Iberis, Hutchinsia, Dentaria, Vella, Koniga.
7. Resedaceæ,	1	3	1	2	1	3	
8. Cistineæ,	1	5	1	1	1	1	
9. Violariæ,	1	8	1	8	1	8	Frankenia.
10. Droseraceæ,	1	3	1	3	1	3	
11. Polygaleæ,	1	1	1	1	1	1	
12. Frankeniaceæ,	1	2					
13. Elatineæ,	1	2	1	1	1	1	
14. Caryophylleæ,	12	50	12	49	10	36	{ Buffonia, Cherleria, Holosteum, Moenchia.
15. Lineæ,	2	4	2	2	2	5	
16. Malvaceæ,	3	6	3	5	3	5	Impatiens.
17. Tiliaciæ,	1	3	1	2	1	2	
18. Hypericineæ,	2	10	2	12	2	10	
19. Acerineæ,	1	2	1	2	1	2	
20. Geraniaceæ,	2	16	2	15	2	13	
21. Balsamineæ,	1	1	1	1			Staphylea.
22. Oxalideæ,	1	2	1	2	1	1	
23. Celastrineæ,	2	2	1	1	1	1	
24. Rhamneæ,	1	2	1	2	1	2	
25. Leguminosæ,	17	65	17	48	16	41	
26. Rosaceæ,	11	50	10	43	10	41	{ Hippocrepis, Onobrychis, Oxytropis. Sibbaldia. Mespilus.
27. Pomaceæ,	4	10	2	5	2	5	
28. Amygdaleæ,	1	5	1	5	1	5	
29. Sanguisorbeæ,	3	5	3	6	2	4	Sanguisorba.
30. Onagariæ,	4	12	2	11	2	8	
31. Haloragææ,	3	6	3	4	3	5	Isnardia, Œnothera.
32. Ceratophylleæ,	1	2	1	1	1	2	
33. Lythriæ,	2	3	2	2	2	4	Tamarix.
34. Tamariscineæ,	1	1					
35. Cucurbitaceæ,	1	1	1	1			Bryonia.
36. Portulacææ,	1	1	1	1	1	1	
37. Paronychieæ,	5	7	1	2	1	1	{ Corrigiola, Herniaria, Illecebrum, Polycarpon. Tillæa.
38. Crassulaceæ,	5	16	4	10	4	10	
39. Grossulariææ,	1	6	1	5	1	3	{ Æthusa, Coriandrum, Meum, Seseli, Tordylium, Petroselinum, Physospermum, Sison.
40. Saxifragææ,	2	13	2	17	2	16	
41. Umbelliferæ,	40	62	30	47	30	44	
42. Araliææ,	2	2	2	2	2	2	
43. Corneæ,	1	2	1	2	1	1	

ORDERS.	England.		Scotland.		Ireland.		British Genera not represented in the Irish Flora.
	Gen.	Sp.	Gen.	Sp.	Gen.	Sp.	
44. Lorantheæ,	1	1	1	1			Viscum.
45. Caprifoliaceæ,	4	8	4	7	3	4	Linnaea.
46. Stellatæ,	4	18	3	16	4	13	
47. Valerianææ,	2	7	2	5	2	4	
48. Dipsacææ,	3	6	3	5	3	3	
49. Compositæ,	48	122	43	106	40	87	Borkhausia, Chrysocoma, Cineraria, Conyza, Diotis, Doronicum, Lactuca, Echinophora, Onopordum, Serratula
50. Campanulaceæ,	2	11	1	7	1	4	Phyteuma.
51. Lobeliaceæ,	2	3	2	2	2	2	
52. Vacciniææ,	1	4	1	4	1	3	
53. Ericææ,	4	7	6	9	5	9	Azalea.
54. Monotropeæ,	2	4	2	5	2	5	
55. Illicinææ,	1	1	1	1	1	1	
56. Oleinææ,	2	2	2	2	2	2	
57. Apocynææ,	1	2	1	2	1	2	
58. Gentianææ,	7	14	3	8	6	11	Swertia.
59. Polemoniaceæ,	1	1	1	1	1	1	
60. Convolvulaceæ,	2	5	2	5	2	4	
61. Boraginææ,	10	23	10	21	8	15	Asperugo, Pulmonaria.
62. Solanææ,	5	12	4	8	5	7	
63. Orobanchææ,	2	7	2	3	2	4	
64. Scrophularinææ,	12	42	11	35	11	32	Limnæa.
65. Labiatæ,	23	54	21	42	20	42	Acinos, Melittis
66. Verbenacææ,	1	1	1	1	1	1	
67. Lentibulariææ,	2	5	2	6	2	6	
68. Primulacææ,	9	17	7	15	7	13	Cyclamen, Trientalis.
69. Plumbaginææ,	1	5	1	3	1	3	
70. Plantaginææ,	2	6	2	6	2	6	
71. Amaranthacææ,	1	1					Amaranthus.
72. Chenopodeææ,	5	23	5	18	5	19	
73. Polygonææ,	3	23	3	21	3	20	
74. Eleagneææ,	1	1	1	1			Hippophae.
75. Thymelææ,	1	1	1	1			Daphne.
76. Santalacææ,	1	1					Thesium.
77. Aristolochiææ,	2	2	1	1			Aristolochia, Asarum.
78. Empetretææ,	1	1	1	1	1	1	
79. Euphorbiacææ,	3	16	2	9	2	9	Buxus.
80. Urticææ,	3	5	3	4	3	5	
81. Ulmæææ,	1	7	1	4	1	4	
82. Betulinææ,	2	2	2	3	2	2	
83. Salicinææ,	2	50	2	65	2	35	
84. Corylacææ,	5	6	5	6	5	6	Castanea.
85. Myricææ,	1	1	1	1	1	1	
86. Coniferææ,	2	2	3	3	3	3	
87. Alismacææ,	3	5	1	3	2	4	Actinocarpus.
88. Butomææ,	1	1	1	1	1	1	
89. Juncaginææ,	2	3	2	3	1	2	Scheuchzeria.
90. Aroidææ,	1	1	1	1	1	1	
91. Acoracææ,	1	1	1	1			Acorus.
92. Typhacææ,	2	6	2	5	2	5	
93. Pistiacææ,	1	4	1	4	1	4	
94. Fluviales	4	18	4	16	4	15	

ORDERS.	England.		Scotland.		Ireland.		British Genera not represented in the Irish Flora.
	Gen.	Sp.	Gen.	Sp.	Gen.	Sp.	
95. Smilacææ,	3	5	3	5	2	2	Ruscus.
96. Liliacææ,	2	2	1	1			Tulipa.
97. Asphodeleææ,	8	18	6	11	3	6	{ Anthericum, Asparagus, Gagea, Muscari, Ornithogalum.
98. Melanthaceææ,	2	2	2	2	1	1	Tofieldia.
99. Eriocauloneææ,			1	1	1	1	
100. Junceææ,	3	22	3	25	3	16	
101. Hydrocharideææ,	2	2	2	2	2	2	
102. Orchideææ,	12	35	8	19	8	22	{ Aceras, Corallorhiza, Cypripedium, Goodyera, Herminium, Liparis
103. Irideææ,	3	9	1	1	2	3	Trichonema.
104. Amaryllideææ,	3	5	2	2	2	4	Leucojum.
105. Dioscoreææ,	1	1					Tamus.
106. Gramineææ,	40	113	32	96	30	80	{ Cynodon, Gastridium, Hierochloe, Knappia, Panicum, Setaria, Spartina, Stipa, Lagurus, Polypogon.
107. Cyperaceææ,	10	78	9	81	8	66	Cyperus, Elyna.

II.—*Voyage aux Indes Orientales, par le nord de l'Europe, pendant les années 1825–26–27–28 and 29.* ZOOLOGIE, par MM. C. BELANGER, ISIDORE GEOFFROY SAINT HILAIRE, LESSON, VALENCIENNES, DESHAYES, et GUERIN. 8vo. Avec atlas grand in 4to. Paris, Arthur Bertrand, 1834.

THOUGH the above noted volumes commenced their appearance more than two years since, we have thought them sufficiently important, and sufficiently little known to the British Zoologist, to merit a short notice under our section of “Reviews and Analysis;” while the botanical portion, having lately commenced, the entire work may be said to be only approaching its completion.

M. C. Belanger was one of those enthusiastic naturalists whom the superintendents of the continental museums have employed with so much success; and we cannot help expressing our regret that something similar is not attempted by the institutions of this country, assisted by our government. Young men possessed of an ardent love of nature are selected, they are brought to the capital, and receive instructions, and study under the first professors. The desiderata in every branch are pointed out, the facts and species which require elucidation, species which have not been sufficiently made out, physiological investigations which can only be noted on the spot which the animal inhabits, and a long list of queries to be solved, in all the departments, are given to them before they are

dispatched on their various expeditions ; and if they do not always possess the experience of matured study, they are at the season of life when their zeal is ardent, and their activity and enthusiasm are unbounded. It is in this manner that the collections on the continent so long surpassed in the number of species those of this country ; and the expense of maintaining those travelling naturalists is in reality not greater, than that arising from the large prices occasionally paid for some privately procured collection, or for some rare specimen. Returning from the expedition, the results are placed in the hands of gentlemen versed by long experience in the branches they undertake, and, as in the present instance, they often appear as a series of essays by the individuals to whom they had been entrusted.

Belanger left Paris in 1825. He crossed Germany, Poland, Southern Prussia, Georgia, and the Persian Provinces under the Russian dominion, and penetrating into Persia, he embarked for Bombay, and finally arrived at Pondicherry in the commencement of 1836. Persia he crossed from Erivan to Bouchir, running over the most interesting parts, but travelling with a caravan, and being dependent on the season for crossing the Caucasian chain, the time spent in this country was comparatively lost. At Bombay he suffered under ill health brought on by the climate and exertion, but visited the Isle of Elephanta and the coast of Malabar, and made some additions to his collections ; but it was not till some time after his arrival at Pondicherry, which he made head-quarters, that the most profitable part of his expedition might be said really to commence. From hence he made extensive excursions, and for a time removed to Bengal, where he explored the riches of the Ganges.—Again penetrating by the river Irawaddi, already known as the scene of the botanical labours of Wallich, he visited Pegu, endeavouring to collect in his way the productions of the river and its tributaries. Returning to Pondicherry, he made another excursion to the islands and the Straits of Sunda, examining principally the eastern coasts of Java, in the districts of Buitenzorg and Bantam, where Raffles and Horsfield, Khul and Van-Hasselt, had previously toiled in the same vocation, and finally, on account of his health, returned to his country by the Isles of France and Bourbon, and the Cape of Good Hope. The results of this expedition were by his own account, 25 mammalia ; 240 birds ; 60 reptiles ; 250 fishes ; 300 mollusca ; 500 insects ; and 10 crustacea ; in all, 1385 subjects, (it may be remarked, that those which had been met with in Persia were unfortunately lost before their arrival in France,)

and among these, more than 360 new species or genera were said to be discovered,—a fact which we rather doubt, and which is scarcely borne out by the volumes now before us. Arrived in France, these were put under the care of MM. Isid. Geoffroy Saint Hilaire, Lesson, Valenciennes, Deshayes and Guerin; the historical and botanical portions being entrusted to Belanger. The present volumes, the one an 8vo of descriptive letter-press, the other a 4to atlas of illustrative plates, are devoted to Zoology alone, and we shall now shortly notice them.

Mammifères par M. Isidore Geoff. Saint Hilaire.—Commences by some short general remarks upon Geographic Zoology.—Next a tabular view of the monkeys of the old world is given, intended as a supplement to what Humboldt has done for those of the new. To Humboldt's Synopsis a considerable number will now have to be added; and such is the progress of zoology, that in the last two years, M. Geoffroy's present list can be yet enlarged. In conclusion, a table is given showing the species of Desmarest and those of Geoffroy. Of the first, 42 species are given as really authenticated; in the last they are increased to 50. In the first, 4 are held to be altogether suppressed as synonymous or false, and 3 as doubtful. In his own list, 8 are styled as resting upon indifferent authority, and the total number recorded in 1834 are estimated at 58. Geoffroy next proceeds to describe five species which he considers new, but without reference to their being procured during the expedition of Belanger, or of being natives of India. Two of these are figured, *Semnopithecus cucullatus*, Geoff. a native of the coast of Malabar, and vicinity of Bombay, and somewhat allied apparently to the *S. maurus*; and *Macacus aureus*, Geoff. also a native of India and the Islands, and previously noticed as the *Cercopithecus mulatta*.

Among the Cheiroptera, five species are described, and *Vespertilio Belangerii*, Geoff., considered new, is figured, inhabiting the coast of Coromandel, and the houses in the vicinity of Pondicherry.

The genus *Tupaia* of Raffles is first noticed among the "Insectivores." Speaking of the discovery of this curious genus, he says, it has been sometimes attributed to Raffles, sometimes to Diard; but the truth is, that it belongs to neither of these travellers, but to M. Leschenault de la Tour, who sent a specimen to the Paris museum in 1807. The known species seem to be under a certain confusion, the young and adult being similarly named at one time, and the reverse at another, by various authors. But M. Geoffroy thinks that the collection of Belanger possessed another, perfectly distinct from any of the states of the formerly known animals, and

it is described and figured under the title of “*Tupaia du Pegow.*” It is confessedly, however, nearly allied.

The genus *Sorex* next claims attention. Five Indian species are noticed, with some useful observations, and a table of the distinctions which separate some of the allied species. Four African species are also indicated.

Of the Carnivora, a new *Felis* is described and figured under the title of *F. rubiginosa*; it is most closely allied to the *F. torquata* of *F. Cuvier*, is about the size of the domestic cat, and was found in the higher woods in the vicinity of Pondicherry. A new genus is established under the name of *Melogale*; but in our correspondence with Mr Gray, that gentleman considers it as the same as his genus *Helictes*, described in the proceedings of the Zoological Society; and *M. personata*, Geoff. as probably identical with *Gulo orientalis* of Horsfield. It was found by M. Belanger in the vicinity of Rangoon. The entire length of the animal is about one foot one inch without the tail, that member, being wanting in the specimen, is supposed to be about eight inches. The dental system is

Upper jaw.	{	6 incis.	{	6 false mol.	Under jaw.	{	6 incis.	{	8 false mol.
		2 can.					2 can.		
		10 mol.					12 mol.		
				2 can.					2 can.
				2 tuberc.					2 tuberc.
									Total, 38.

The Mammalia are concluded by the “*Rongeurs.*” Five squirrels are described, a hare, and a species of *Spermophilus*, the only animal noticed from Persia; a figure is given under the title of *S. concolor*, Geoff. The entire length of this little animal is about thirteen inches, of which the tail is three. The general colour is a pale-fawn, darker at the upper parts, and the tail, flattened and square at the end, is terminated by a black ring, then one of white, and lastly another of black, more indistinct. It was met with in the vast plains in the Persian province of Azerbaidjan. It burrows, and conveys grains to its retreat, therefore it is eagerly sought to be extirpated,

Oiseaux, par René-Primevere Lesson.—Commences by an essay on the geographical distribution of birds, containing general observations on this subject. The second chapter is entitled, “Description de plusieurs espèces d’oiseaux nouvelles, ou quelque autres encore incomplètement caractérisées dans les auteurs.” The whole number of birds here described is thirty-nine; many of these, however, are neither from India or from the collection of Belanger, and we shall confine our notice to those which have been thought worthy of being figured, or have been brought to Europe by our traveller.

Pernis maculosa, Less. a name applied on account of the mottled state of the plumage. From the dimensions, twenty-two inches in length, this seems the immature state of the *P. apivorus*, where white much predominates. *Melias tristis*, from the neighbourhood of Pegu, is figured as new, while a doubt is held out that it may be the *Phænocophaeus melanagnathus* of Horsfield (Trans. Linn. Soc.) *Garrulax Belangerii*, Less. considered new, and procured during the expedition of Belanger. The bird figured under this title is the *Corvus leucocephalus* of Hardwicke, (Trans. Linn. Soc.) the *Glandarius leucocephalus* of Gould, (Illust. Himal.) From this and another bird figured under the title of *Gar. rubrifrons*, Less. that gentleman has formed his genus *Garrulax*, allied to *Turdus*, he thinks, and to be placed after *Myophonus*. They nevertheless appear to us to come much closer to *Glandarius*, if they can at all bear separation. The first was procured at Pegu, the latter, Java. *Cryptonix Dussumierii*, Less. is certainly the *C. niger* of Vigors; but while M. Lesson has given this bird a new appellation, he at the same time advances another theory. The males of this genus, he remarks, have the eyes always surrounded by a bare and turgid space; in his *C. Dussumieri*, the cheeks are entirely covered with feathers, hence it *must be* a female (an alternative not necessary,) and is in reality that sex of the *C. coronatus*, while the birds which we have been in the habit of considering the female of this species, and the figure of the Planches Colories (Pl. cccli.) is a young male in immature plumage. The species described are from the Straits of Malacca, and, he adds, is very rare. Neither the *C. coronatus*, nor this black bird, however, seem uncommon in British collections, or in those of the dealers. *Phasianus Reynaudii*, Less. M. & F., approaches close to the *Ph. lineatus* of Latham; indeed, in our correspondence with Mr Gray remarks, that it is the same, "as I have proved by comparing the figure with the original drawing in possession of the veteran English ornithologist." Drawings which we have lately received, taken from recent specimens, however, seem to differ somewhat from Lesson's figure. The female, we believe, has not been previously represented. *Otis aurita*. Figured in an immature state. This appears a very rare bird. Few collections possess it adult. The Museum of Paris has it not. M. Lesson found it on the coast of Coromandel, and remarks, "Nous ne connaissons point de figure de l'individu adult." If he will examine Forbes' Oriental Memoirs, he will find one; and in Illust. of Ornith. by Sir W. Jardine and P. J. Selby, three, of the adult male and female,

and of the immature young somewhat similar to what he has represented.

Reptiles, par Rene-Primevere Lesson.—This portion of the work is confined to the mere descriptions of thirty-three species, seven of which are figured. One or two new genera and families are proposed, but the characters are so slightly and shortly given, that it is not necessary to notice them. And *Tetraonyx*, Mr Gray remarks, appears to be formed from an imperfect specimen of a young *Emys*. The same gentleman considers *Emys Belangerii* as identical with *E. trijuga*; *E. flavonigra* as *E. thuga*; and *E. trigibbosa* as *E. tecta*.

Poissons, par A. Valenciennes.—Commences by a few short preliminary observations. Upon the coast of Malabar, to judge from the collection of Belanger, and the fishes also procured by Dussumier, the family of the Scienoides among the Acanthropterygii, and of the Clupeadæ among the Malacopterygii are the most numerous. At the same time the absence of many jugular fishes is particularly remarkable upon a generally sandy shore; and the Apodes also seem few in number. The fresh waters possess some curious forms, particularly of the Cyprinoides, of which M. Belanger collected a considerable number, but in the river fishes he has been in a great measure anticipated by the work of Hamilton Buchanan, although that author is not perhaps always correct in the generic situation of his species. Eighteen species are in all described, of which ten are figured. *Pterois* is a curiously formed genus, and the members of it ascend the fresh waters periodically like the Salmonidæ. They also appear to undergo a seasonal change of colour. The abode in the fresh water is, however, so detrimental, that they become weak, and are even carried down the stream upon their sides, while after a sojourn in the salt water, their active habits and brilliant silvery tints are speedily recovered. M. Valenciennes asks what is the cause of this, and remarks, “that we cannot believe that the act of spawning is the only cause of the disease of those fishes, for it is certain that many species of salmon periodically enter the river, and do not every time spawn. (Car il est incontestable, que plusieurs espèces de saumon entrent périodiquement dans les rivières, et qu’elles n’y fraient pas chaque fois.) A fact stated so, by an ichthyologist of such celebrity, must have some weight. We are not aware that it is a common fact, or a fact at all, that any of the salmon periodically enter rivers and return without spawning; but as he promises to dilate upon these and other points when treating of the Salmonidæ in the *Histoire Naturelle des Poissons*, now de-

volved upon him, we shall without further remark wait patiently but anxiously for the appearance of the volume. The greater portion of the fishes noticed in this essay have been previously described in *Histoire Nat. des Poissons*, or by Hamilton Buchanan, to whom reference is frequently made.

Mollusques, par G. P. Deshayes.—Commences by “*Reflexions sommaires sur l'importance de l'étude des mollusques appliquer à l'histoire chronologique du globe terrestre.*” Of the shells twenty-one species are described, and they are all figured; among them seven from the land and fresh water, which are interesting on account of so few, until lately, from these localities being attended to. *Helix*, *Cyclostoma*, *Planorbis*, *Limnea*, and *Paludina*. The essay is concluded by an interesting table of the living shells of India and the Mediterranean, found in Europe in a fossil state, with the localities where the fossils occur.

Insectes, par F. E. Guérin.—Commences by an essay, “*Essai d'un nouveau arrangement des hemipteres de la section des Homopteres, et revision de la tribu des Fulgorelles.*” Several new genera are proposed; forty-one species are described as new, and all figured; and it may be mentioned that the authors of the mollusca and insects have added Latin specific characters to the species they describe, which we consider an improvement upon the other essays in the volume.

Zoophytes, par R. P. Lesson.—Only two species are described, the one *Tubastrea coccinea*, Less. from one of the Society Islands, and *Sarcophyton lobulatum*, Less. from Port Praslin in New Ireland. Both are beautifully figured.

III.—*Neue Wirbelthiere zu der Fauna von Abyssinien gehörig, entdeckt und beschrieben, von Dr EDWARD RÜPPELL. Lieferung 1, 6. Frankfurt, 1835-1836.*

THIS work is a continuation of the former “*Zoologischen Atlas zu der Reise im Nördlichen Afrika*,” published by the very enterprising and scientific traveller whose name it bears, and to whose energies the town of Frankfort on the Maine is indebted for a zoological museum of the first importance, indeed, so rich, that it must be rated next to the large national collections of England, France, Prussia, and Holland, and before any others of the principalities or towns of Europe.

This collection of Abyssinian Vertebrata is published in numbers. It commenced 1st January 1835; a number appears every three

months, and twelve will compose the present series, so that we may expect its completion in January 1837. Six numbers are now before us; of these one is devoted to Mammalia, two to Birds, one to Reptiles, and two to Fishes.

The first plate of the Mammalia represents a beautiful species of the rare African genus *Colobus*, *C. guereza*, Rüpp. discovered in the wooded and marshy valleys of south and west Abyssinia, (in the provinces of Godjam and Kulla.) It is jetty black, white cheeks and throat, with a fringe of long white hair arising from the back and hanging down upon the sides, looking as if it were covered with a long veil; but we add the specific characters.

Colobus guereza, Rüpp.—Corpore, facie, sincipite, auchenio et cauda ad dimidium usque aterrimis; tēnia frontali, regione temporalī, parauchenio, mento, gutture et cingulo ab interscapulio ad primam elongato,—villis sericeis longissimis, præcordia hypochondria et lumbos obtegentibus—candidissimis, niveis. Cauda parte posteriore albicans floccosa, callus analis colore nigro, albo limbato.

Macacus gelada, Rüpp. occupies plate second, a large species of ape. And under the description of this species, it is mentioned that the little lemur figured by R. Brown in his *Illustrations of Zoology* (t. 44,) which he had referred to *Octolicnus Senagalensis*, is quite a distinct species. Three species of antelope and a goat are also described. *Ant. defassa*, Rüpp. Tab. 3, a species which has been alive for some time in the gardens of the Zoological Society, where it is named *Ant. sing-sing*. *Ant. decula*, Rüpp. Tab. 4, very like *Ant. scripta*, but wanting the dorsal stripe, and some of the transverse ones on the hinder part of the back. *Ant. beisa*, Rüpp. Tab. 5, a very fine species, and probably the milk-white antelope described by Pennant from a drawing made in Persia, and from which Pallas established his *A. leucoryx*. It is quite distinct, however, from the *A. leucoryx* of Lichtenstein, which comes from the Cape; and, if these surmises should prove correct, the recovery of the species is very interesting. Rüppell obtained it living in small families during the rainy season, in the low moist valleys on the coast provinces of Massaua.

A. beisa, Rüpp.—Mas adultus. Antelope cornibus longis, rotundatis, tenuibus, rectis, parte basali annulatis. Facies exalbida, vittis tribus ex fusco umbrinis valde distincta, quarum una a fronte ad regionem nasalem lata, sed inter oculos angustior, altera a fronte per oculum adgenam, tertia a regione parotideæ ad gulam producta. Ejusdem coloris sunt,—tēnia, a gula collo anteriore ad sternum decedens, ubi divisa ad latera pectoris et abdominis decurrit,—annilla antibrachii, et caudæ apex comatus. Corporis colore isabellino, pectoris et abdominis albicante, juba cervicali et dorsali, rubiginosa.—Fœmina adulta differt a mare juba cervicali et dorsali corporis colore.

Capra walia, Rüpp. Tab. 6, is very like the *C. ibex*, but it has a prominence between the base of the horns, and the legs are coloured like those of *C. Nubiana* and *C. Siberica*.

The birds described and figured are three species of hornbill, *Buceros cristatus*, *B. limbatus*, and *B. flavirostris*, all somewhat allied, however, to species already known. *Corythair leucotis*, Rüpp. Tab. 3, a new species, at once distinguished by the white patch at the extremity of the auricular feathers, and making this beautiful genus now consist of six.

Corythair leucotis, Rüpp.—Rostro coccineo; palpebris superioribus papillis carneis; pileo crista plicatili obscure viridescenti ornato; collo et pectore laete prasinis; abdomine et tibiis canescentibus; dorso, alis et cauda ex violaceo viride-splendentibus; remigibus ex sanguineo purpurascens viride marginatis—macula anteocularis et plaga auricularis ad collum decedens niveæ.

Chizaerhis zonurus, Rüpp. Tab. 4. Very interesting, as being the second species of the genus, and observed by our traveller in the province of Dembea, &c. It is nearly of the size of the *Ch. (musophaga)* variegatus, and will be at once distinguished by the form of the crest, and the white band on the tail.

Ch. zonurus, Rüpp.—Rostro citrino, capite et collo ex badia fuscentibus, plumis nuchæ elongatis, lanceolatis, albo marginatis, gastraco et tibiis ex umbrino et albido variis.—Corpus supra ex umbrino cinerascens remigibus nigricantibus; eorum vexillis internis macula alba. Rectrices dilute brunneæ, earum concolores, quatuor externæ media parte taenia ex albida lata, apicibus fuliginosis.

Corvus crassirostris, Rüpp. Tab. 8.—Considered by Rüppell as distinct but closely allied to the strong-billed species of southern Africa. The distribution of the European crows is mentioned here (p. 10,) from which it appears that the *C. cornix* is pretty abundant during winter between Cairo and Suez. *C. monedula* and *frugilegus* in lower Egypt, and *Pica vulgaris* during winter in lower Egypt. *C. affinis* and *Capensis* are described, but a diagram of the heads and bills is only given. *Ptilonorhynchus albirostris*, Rüpp. Tab. 9. This is an interesting form; and, if true to the type of the genus in which Rüppell has placed it, will show a wider distribution than what was imagined, the form not having been hitherto seen on the African continent. It is a gregarious species; and, to judge from the habits and distribution of colour, and the figure which we have in this atlas, we should be inclined to consider coming closer to the *Lamprocorni*. The male and female are figured.

Pt. albirostris, Rüpp.—Mas, colore supra et subtus nigro splendore cæruleo, remigibus primariis rubiginosis, apice nigro, tectricibus majoribus et cauda nigris, rostro albido. Fœm, capite collo et pectore cinereo cærulescente.

Three Lamprotorni, *L. tenuirostris*, *L. rufiventris*, *L. chalybeus*. *Oriolus moloxitta*, Buffon, Tab. 12, Fig. 1, which appears hitherto to have been confounded by various authors, as identical with some of the other black-headed species. *Prionops cristatus*, Rüpp. Tab. 12, Fig. 2, interesting as being a second species of the genus, perhaps identical with *Lanius cineraceus* of Latham. *Perdix melanocephala*, Rüpp. Tab. 5, allied in the form, colouring, and distribution of the markings to the little group, of which the red-legged partridges, *P. rubra*, *saxatilis*, and their allies of southern Europe and northern Africa are typical. A very beautiful bird, and apparently rare, as only two specimens were procured.

Perdix melanocephala, Rüpp.—Vitta frontali supra pileum ad nucham usque ducta,—infraorbitali, et collari ab regione parotideâ, quæ ex albedo et nigro striolata, per latera colli ad pectus plaga angustiori elongata, nigris; vitta superciliari lata et gula nivea; collo et medio abdominis ex isabellino rufescente; corpore supra schistaceo, plumis margine rufescentibus, infra dilutiori; hypochondriis fasciis albescentibus utrinque nigro marginatis; cauda supra subtilissimè undulata; rostro et pedibus colore corallino.

Perdix Erckellii, Rüpp. Tab. 6, coming into the division which contains the *P. nudicollis* of authors.

P. Erckellii, Rüpp.—Pileo castaneo; frontis et faciei plumulis rigidioribus nigris albo striolatis; macula post oculari et gula albis; plumis colli castaneis, albo marginatis—pectoris griseis, stria intermedia lanceolata castanea—abdominis, crissi et hypochondriorum albicantibus stria intermedia lanceolata et margine castaneis.—Dorsalibus et alarum tectricibus hepaticis, margine castaneis, tergo, uropygio, rectricibus et remigibus hepaticis, secundarium vexillis externis colore dilutiori undulatis, rostrum et pedes colore corneo, pedes maris bicalcarati.

A fine *Otis*, *O. melanogaster*, Rüpp. Tab. 7, is figured; the conclusion of the description is, however, deferred till next number: *melanogaster* is not a very good appellative for any of the bustards, as the summer or breeding plumage of nearly all is deep-black on the lower parts.

The part containing the Reptiles consists of figures and descriptions of three tortoises. *Pentonyx gehafie*, Rüpp. Tab. 1, somewhat similar to the Test. subrufa of the Cape of Good Hope, but differs from it by a character which also separates it from all the other tortoises known, viz. the pectoral pair of plates are triangular, and do not reach to the centre of the sternum. If many specimens had not been found, one would at first sight have been induced to have considered this structure as an accidental formation. The other true chelones belong to the genus *Chelonia*, the species of which are so difficult to determine, on account of the great variation which take

place in the form of the shield at the different periods of their growth, and in the number of plates of the shield and the head of the animal, in different specimens of the same species. *Carretta bissa*, Rüpp. Tab. 2, and *C. olivacea*, Eschscholtz, Tab. 3. *Agama colonorum*, Daud. Tab. 4. *Stellio cyanogaster*, Rüpp. Tab. 5. *Trapelus flavimaculatus*, Rüpp. *Hemidactylus flavi-viridis*, Rüpp.; and *Pristurus flavipunctatus*, Rüpp. Tab. 6. are all interesting, as being figured and coloured from the living animals. And the genus *Pristurus*, apparently belonging to the slender-toed Geckoes, and very peculiar for having a long, much compressed tail, serrated on both its edges, is now described and characterized for the first time.

Pristurus, Rüpp. Char. Gen.—Caput subdepressum, breve, anticè rotundatum: Nares laterales prope apicem rostri: oculi magni, pupilla nocturna, subrotunda: membrana tympani profunde latens: lingua crassa, depressa, apice integro: dentes maxillares integri æquales, uncinati: cutis trunci sublævis, subtilissime reticulata: pedes pentadactyli, digiti graciles, rotundati, elongati, uncinati: cauda compressa, elongata, supra et infra carina serrata: pori femorales nulli.

Of the fishes, forty-six species are described and figured in the two numbers already published, most of them are coloured from the fish when alive. Among them are what Dr Rüppell considers the types of four new genera, of which we shall add his characters.

Enneapterygius, Rüpp. Char. Gen.—Caput alepidotum, preoperculum carinis duabis, operculum supra pinnas pectorales elongatum. Os labiis carneis, dentibus setaceis minutissimis per multis armatum, membrana branchialis sub gula continuata, radiis 7. Corpus squamis magnis, margine serrato; linea lateralis sola parte anteriore expressa, pinnæ dorsales tres, duæ anteriores spinosæ. Pinnæ ventrales thoracici, radiis binis veluti Blennii. Allied to *Scorpaena*. Species, *Enneapt. pusillus*, Rüpp.

Gazza, Rüpp. Char. Gen.—Corpus compressum, cute squamis minutissimis tecta ore mediocri, multum protractili, unica serie dentium uncinatorum armata, e quibus nonnulli fortiores elongati. Dentes palatalis et vomerales nulli preoperculum margine duplici, externo parte inferiore serrato. Characteres reliquis generis *Equula* præter spinas ad latera pinnæ dorsalis et analis, quæ tactu sed non visu conspicuæ sunt. Allied to *Equula*. Species, *Gazza equulæformis*, Rüpp.

Pseudochromis, Rüpp. Char. Gen.—Dentes in utraque maxilla uniseriati, minuti, conici, antice fortiores, irregulares, uncinati; dentes palatini sphaeroidi minutissimi, triplici plaga dispositi, arcum semilunarem æquantes; dentes pharyngei uncinati, setiformes; rictus oris minutus. Labia mediocria; os non protractile; operculum angulo postico elongato, preoperculum margine integro, utrumque squamis minutis tectum; apertura branchialis sub gula continuata; membrana branchialis radiis sex. Linea lateralis interrupta; radii tres anteriores pinnæ dorsalis et analis spinosi, reliqui flexibiles. Allied to *Julis*, Cuv.—Species, *Pseud. olivaceus, flavivertex*, Rüpp.

Xenodon, Rüpp. Char. Gen.—Dentes in utraque maxilla 8, ordonati, com-

pressi, cestiformes, excepto pari secundo maxillæ superioris, qui cuneiformes ceterisque longiores; characteres reliqui a Balistibus non different.—Species Xen. niger, Rüpp.

In conclusion of this short analysis, we may observe, that the plates are lithographic, and are accurately drawn and well coloured.

BIBLIOGRAPHICAL NOTICES.

A History of British Quadrupeds. By THOMAS BELL, F. R. S., &c. Illustrated by a wood-cut of each Species, and numerous Vignettes. Nos. i. ii. London, Von Voorst. 8vo. 1836.

THIS work is commenced upon the same plan, and in the same beautiful style of typography and wood-cutting with Mr Yarrell's *British Fishes** to which we expect it will prove a worthy companion. The whole of the first number and the greater portion of the second, are devoted to the *Cheiroptera*; and although the size of the wood-cuts is rather against the marking of the distinctive characters of this difficult family, this is at once remedied by vignettes devoted to these parts, being of the natural size, which renders the explanation distinct, and the characters easily seized upon. These are taken by Mr Bell principally from the proportions of the ear and tragus, and from the relative proportions of the ear to the head and tragus, together with the formula of dentition. The notch-eared bat, *Vesp. emarginatus*, Geoff. is given as British, on the authority of the meagre description of its discoverer, who says that it was received, "at some distance from Dover." This increases the British list of *Vespertiliones* to twelve, eleven being described in Jenyns's Manual, and the *V. emarginatus* of that author being in the present work considered identical with the *V. Daubentonii*, Leis. The work will be completed in eight numbers, at 2s. 6d. each, the first of which appeared on the 1st July, and we promise an analysis upon its completion.

Rumphia,—*Sive commentationes botanicæ imprimis de plantis Indiæ orientalis, tum penitus incognitis, tum quæ in libris Rheedii, Rumphii, Roxburghii, Wallichii, aliorumque recensentur, auctore C. L. BLUME.*

COMMENCED under the care of Professor Blume, as a supplement to the "*Flora Javæ*" of that botanist, of the same size, and si-

* We may announce the completion of Mr Yarrell's work, which it will soon be our duty to notice more minutely. The two last numbers were received too late to prepare an analysis for our present number.

milar in type and execution. It will be completed in thirty-six livraisons, forming three folio volumes. It will appear every three months. The price of each livraison to subscribers will be five florins and a-half.

Flora Metropolitana, or Botanical Rambles within thirty miles of London, intended for the Student in Practical Botany. By DANIEL COOPER. 12mo. Pp. 139. London, S. HIGHLEY, 1836.

SCARCELY a "Flora" in the proper acceptation of the name. Partial lists are given of the species found about particular villages, heaths, woods, &c. One hundred and fifty places are named, and each is followed by a list of the plants which grow near it. In a few, the most common are even recorded, but generally some of the rarer species only, and the nature of the subsoil is occasionally mentioned. The work will be useful to the London botanist as a companion in his excursions. A list of the "land and fresh water shells found in the environs of London," with the localities of each, is appended to the volume.

The Ornithologist's Text-Book, being Reviews of Ornithological Works, with an Appendix containing Discussions on various topics of Interest. By NEVILLE WOOD, Esq. 12mo. Pp. 232. London, W. Parker, 1836.

THE idea of the work is good, and a volume comprising tables of the various ornithological systems, and a list of all the works upon this branch of Natural History, (either arranged alphabetically or chronologically,) with a short analysis of their contents, would be of much use to the ornithologist.

The present work is divided into two parts and a supplement. In the first, or "notices of ornithological works," 109 notices are given, (the various works of an author being generally placed together;) but they are written much too superficially to be of real use, and without a sufficient acquaintance with the works analyzed: some have not been seen at all, such as Illiger's most useful prodromus, and it is passed with that acknowledgment only. Merrem's "Icones et Descriptiones" have not been seen either, and it is scarcely fair to add to this acknowledgment, "but it is probably of little or no value at the present day;" and for several of the others a review from another work has been substituted for the opinion of the author. Part II. contains tables of seventeen systems, commencing with that of Willoughby, and to its extent this is useful as a reference. The supplement contains some additional notices of books; "Hints for a new and complete

work on general ornithology ;" " On the establishment of a new magazine of natural history ;" Habits of the Ivy wren (*Anorthura troglodytes*, Morris,) being an extract from a work of the author's then in the press ; and some observations " on the English nomenclature of birds."

British Song-Birds, being popular Descriptions and Anecdotes of the Choristers of the Groves. By NEVILLE WOOD, Esq. 12mo. Pp. 408. London, W. Parker, 1836.

IN most of the works entitled " Song" or " Singing-Birds," many species are introduced, which to our ideas have no business there, but we have no right to quarrel with the tastes of the authors, although we cannot perceive the title of the buntings, or common sparrow, or stone-chat, or wheatear, to be called " choristers of the groves." The present volume contains descriptions of seventy-three species, and will be useful to those who possess no work of greater extent. We discover nothing new in it, but there are some pretty descriptions, and one or two interesting anecdotes. One favourite chorister we miss, not certainly of the grove ; but if those of the brake and barren waste are admitted, so may he of our mountain torrents. Mr Wood can never have heard the plaintive melody of the water-ouzel (*Cinclus aquaticus*.) To the nomenclature we decidedly object ; it is often inappropriate, and many of the names may be at once thrown out by using the very rules which our author advocates. We dislike also repetition of the remarks against compilers, and the frequent and sometimes not very gently couched observations upon the works of a living author.

Collection de Perroquets, pour faire suite à la publication de Levaillant, contenant les espèces laissées par cet auteur, ou récemment découvertes, destiné à compléter une monographie figurée de la famille des Psittacidés. Par le Dr A. BOURJAT SAINT HILAIRE. Fol. et 4to.

A work with the above title is about to be commenced as a supplement or continuation of Levaillant. The figures will be lithographic, and are drawn by M. Werner. It will be published in monthly livraisons of four plates each, size, folio and quarto, to correspond with the different editions of Levaillant's work. The price twelve and fifteen francs. From 100 to 150 plates are proposed to be given, but if each is devoted to a species, and the sexes are given where the difference is great, that number will not suffice to represent the additional species known at the present time.

Histoire Naturelle des Poissons. Par M. le BARON CUVIER, et M. A. VALENCIENNES. Tome Onzieme. 8vo. 1836.

THE second volume of this important work which has appeared since the death of its illustrious projector. It contains the families of the *Mugilloides* and *Gobioides*. The first, besides the true mullets, Mugil, Linn. has included in it *Cestræus*, a genus formed from two fishes natives of the fresh waters of the island of Celebs. *Dajaus*, of which the Mugil monticola of Bancroft, inhabiting the fresh waters of the Island of Jamaica, is the type and only species. *Nesitis*, frequenting the coasts of the isles of France and Bourbon, limited to two species, and *Tetragonurus*, Risso, formed from the Mugil niger of Rondelet, apparently a very rare Mediterranean fish, and now standing under the title of Tetragon. Cuvierii, Risso. Of Mugil fifty-two species are described,—an immense increase to the number previously known. Of those frequenting the British coasts it is interesting to know that the *M. curtus* of Yarrell, described from a single specimen of about two inches in length, taken at the mouth of Poole harbour, has been a second time met with by M. Bailon in the bay of the Somme, near Abbeville. One specimen in this instance has also only been met with, about eight inches in length, and M. Valenciennes is of opinion that the characters given by Mr Yarrell stand confirmed.

The *Gobioides*.—Cuvier appears at first to have formed two families. The Blennioides having six rays to the branchial membrane, and the Gobioides having only five, in the present volume they are retained under the last. The family is remarkable as containing several species which are considered viviparous; and the manner in which the female is impregnated has always been a subject of interest to the naturalist, the uncertainty being, whether it took place internally or externally, and we regret that it is still left in doubt. Cuvier has expressed his opinion to be in favour of internal impregnation, “mais avec circonspection;” and M. Valenciennes, while he leans to the same, is unable to satisfy himself from the form of the parts how it can be effected. The family is commenced with the Blennies (*Blennius*) of which thirty species are described. Among those natives of the British seas that figured in Mr Yarrell's work under the title of “The Crested Blenny, *Bl. palmicornis*,” is considered distinct and new, and is dedicated to the commemoration of our own worthy ichthyologist, *Bl. Yarrellii*. Valenciennes has never seen the true *B. palmicornis* except from the Mediterranean, and he has not seen a specimen of Yarrell's fish; but he remarks of it, “we find this species already noticed in Fleming and Nilsson, who have confounded it with the *Bl. galerita* of Linn. Mr Yarrell, perceiving their error, has taken it

for our palmicornis, but this has never more than from 33 to 35 rays, while his species has from 50 to 51." Mr Yarrell's specimen was procured by Dr Johnston near Berwick.

The *Pholis* of Fleming is adopted. A new genus is formed from the *Blennius rostratus*, Solander, a native of the new Guinea seas. It is named from the large developement of the canine teeth, *Blennechis* (βλέννος and εχίς,) and several undescribed species are added. Another contains a single species, *Bl. Bosquianus*, Lacep. In these the character of the gills of *Blennechis* are combined with a wide gape, but with a single row of regular teeth on the outer part of the jaws only, and has been termed *Chasmodes*. The other genera admitted are *Salarias*, remarkable for their moveable teeth, and 33 species are described. *Clinus*, into which the *Bl. argentatus*, Risso, the only European species will range. *Myxodes*, formed from a single species, a native of the N. Holland seas, *Cl. Australis*, Cuv. differing in having the first rays of the dorsal fin separated and advanced upon occiput in the manner of a crest. *Cirrhibarbes*, a native of the seas of South Africa. *Tripterygion*; *Tript. nassus*, Risso, a native of the Mediterranean, is typical; the dorsal fin is divided into three parts or divisions. *Gulnellus*, *Zoarces*, *Anarrhichas*, of the latter a second species *A. leopardus*, Agass. is admitted on the authority of a single specimen in the collection of Munich: and *Opisthognathus*, of which a single species, scarcely perfect, was known to Cuvier, on the publication of the *Règne Animal*. Another has since been discovered from the coast of South America, and is dedicated to the Baron.—*Opist. Cuvierii*, Val.

Histoire Naturelle Generale et Particuliere de tous les Genres de Coquilles Univalves marines à l'état vivant et fossiles, publiée par monographies. Par P. L. DUCLOS. Genre Olive. i. ii. Livraison. Paris, 1835. Folio.

THE two parts published contain eleven plates, on each of which several species of the genus are figured. They are beautifully executed, but, from the expensive style in which the work is brought out, it is to be feared that even the genus now being published will never be finished. The text consists merely of a tabular list of the species to be figured, and an index, occupying in all two leaves.—J. E. G.

Observations on the Genus Unio, together with descriptions of new Genera and Species in the families Naiades, Conchæ, Columacea, Lymnæana, Melaniana and Peristomiana. By ISAAC LEA. 4to, Philadelphia, 1836.

This work consists of four papers, published at intervals in the

Transactions of the American Philosophical Society. It is occupied principally with descriptions of various species of Uniones, most of them American, with a few from China, and has added greatly to our acquaintance with this large genus. To this are appended observations on the species of Naiades described by Lamarck; and the descriptions of some new species of shells belonging to other fresh-water or land families, each species described being illustrated with a characteristic coloured figure.

Mr Lea has charged some of his countrymen with a fault of which he is himself not guiltless—that of capriciously changing the names of several species; and while he has, rightly perhaps, brought together as varieties several of the species described by other authors, he has, in other instances, separated individuals from species on very slight differences. Some of his new species have been previously characterized. *Unio necklinianus*, for example, was described many years ago by Mr Swainson: *U. Murchisonianus* and *Symphynota magnifica* are described and figured in Griffith's Translation of Cuvier's "Règne Animal," *Cyrena Javensis* is *C. Childrenæ* of Wood's Supplement; and *C. rotundata* is only the adult of the same species. *Symphynota bialata* is the young state of *Dipsas plicata* of Dr Leach; *Melanopsis princeps* appears to be only the young of *Pryena ater*; the *Lymnea imperialis* is certainly nothing but the very young state of a *Bulimus*, probably *B. hæmastomus*; and the shell on which Mr Lea has formed his new genus *Aphrodite*, and which he considers should be placed after the genus *Pyrena*, is a well known one, figured by Chemnitz and described by Lamarck, under the name of *Cardium Grœnlandicum*. It is not uncommon on the coast of Greenland, and only differs from the other *cardia* in the small size of its teeth, which are most developed in the younger specimens. Hence Montagu, who considered it a new species, called it *Cardium edentula*.—J. E. G.

Erpetologie Generale ou Histoire Naturelle complete des Reptiles.

Par M. C. DUMERIL and G. BIBRON. Vols. 2, Paris, 8vo.

THIS work, which forms one of an excellent series publishing in Paris under the title of "Suites à Buffon," is intended to give a complete history of reptiles. The first volume is principally occupied with a description of these animals and their organization in general, to which is appended a list of works on the same subjects in chronological order. It contains likewise the methodical distribution of the Chelonian reptiles into orders, families and genera; an account of their structure and manners, and a list of the authors who have treated of them in particular. The second volume contains the

descriptions of the species of Chelonian reptiles : the distribution of the Saurians into their families and genera ; an essay on their organization and habits ; and a similar list of the books which treat of them.

The general observations are written by M. Dumeril ; while every thing relative to the description and determination of the species and their synonyms, has been left to M. Bibron, now his assistant in the museum, and formerly the animal preserver of the department.*

It is much to be regretted that M. Bibron, with the characteristic inconsiderateness of a young naturalist, has deemed it necessary to change capriciously many of the established family, generic and specific names ; but in so doing he follows many of the modern French authors, who thus affect to give a national character to their works. Thus he has named anew all the families of the Chelonian reptiles ; he has changed the name of the genus *Chelydra* of Schweiger, which Fleming also had called *Chelonura*, to *Emysaura* ! *Trionyx* of Geoffroy, which is the same as *Aspidonectes* of Wagler, must now be called *Gymnopsus* ; and *Emyda* of Gray becomes the *Cryptopus* of M. Bibron !

M. Bibron has followed the arrangement of the Chelonians published by Mr Gray in his *Synopsis Reptilium*. He has given a very extensive list of synonyms, copied in a great measure from the elaborate paper on the synonyms of these animals written by the unfortunate Schweiger : and to those is added a very verbose description of the species.—J. E. G.

TRANSACTIONS AND PERIODICALS.—*British.*

The Edinburgh New Philosophical Journal. Conducted by Professor JAMESON. April to July 1836. Edinburgh. A. & C. Black. (Part 1st of Vol. xxi.) 8vo. (Continued from p. 99.)

I. Zoology.

Dr GRAVES of Dublin, "Observations on the Sense of Touch, including an analysis of Weber's works on that subject," copied from the March number of the Dublin Medical Journal, p. 67.—JOHN GRAHAM DALYELL, Esq. "Farther illustrations of the propagation of Scottish Zoophytes." p. 88. Additions to a communication read before the British Association in 1834, and published in a previous number of the Ed. Phil. Journal. The remarks refer to the propagation of "Actinia, Alcyonum, Sertulariæ, Hydra tuba, Tubularia polyceps, and Cristatellæ."—Mr JOHN SILAW, "An account of some experiments and observations on the Parr, and on the ova of the Salmon proving the parr to be the young of the Salmon," p. 99. Interesting experiments plainly detailed, but not "prov-

* Discour. Prelim. p. x.

ing" the parr to be the young of the salmon. Whatever, nevertheless, may be the result of their continuation, they will be of importance either as additions to the natural history of the young states of the salmon, or as elucidating the history of the true parr. It is impossible to detail the author's experiments without transcribing the whole paper; suffice it to say, that Mr Shaw considers that the young of the salmon remain in the river two years before migrating to the sea; that they are during this period in the livery of the parr, and are known as such to anglers; that during the April of the second year they commence to perfect their change to the livery of fry, the scales becoming silvery and easily deciduous, and that they begin their migration downwards so soon as this is completed. The experiments do not proceed beyond this period of their growth.—Mr KING's temperature of quadrupeds, birds, fishes, plants, trees, and earth, as ascertained at different times and places in Arctic America, during Captain Back's expedition, p. 150, a simple table copied from the appendix of Captain Back's last Narrative.

I. Botany.

Dr GRAHAM, "List of new or rare plants which have lately flowered in the neighbourhood of Edinburgh, chiefly in the Royal Botanic Garden, p. 154." "*Acacia lineata*, Cuning.; stipulis subnullis; phyllodiis lineari-spathulatis, subfalcatis, versus marginem superiorem uninerviis, oblique cartilagineo-mucronulatis, ramulorum rotundato pubescentibus; capitulis longe pedunculatis, subgeminis."—" *Begonia Fischeri*; caulescens, foliis oblongis, acutis, inæqualiter cordatis, dentato serratis, utrinque glabris, nitidis; stipulis ovatis, integerrimis; floribus masculis 4-petalis, petalis exterioribus rotundis, concavis, marginibus plano-revolutis; floribus fœmineis 6-petalis, petalis ovato-lanceolatis, alis germinis inæqualiter rotundatis."—" *Begonia sanguinea*, Radd. in Spreng. Syst. Veget. ii. 625, caule ramoso; foliis inæqualiter cordatis, acumınatis, coriaceo-carnosis, glaberrimis, subtus sanguineis, margine crenulato revolutis; germinis alis tribus æqualibus."—" *Bletia patula*; foliis radicalibus, lanceolatis, plicato-nervosis; scapo elato, subramoso; floribus patentissimis; sepalis lanceolato-ellipticis, basi attenuatis, subæqualibus, patulis; labello cucullato, lobis lateralibus rotundatis, intermedio emarginato transverse plicato, disco lamellis 6, subramosis, inæqualibus."—" *Drosera filiformis*; introduced to the Edinburgh gardens in 1834, by Mr James Macnab, from plants found by him in a swamp above Tuckerton, New Jersey, U. S. scapis lateralibus, foliis lineari-filiformibus glanduloso-pilosis, dorso glabris canaliculatis, basi lanatis; staminibus 5; stylis 8, in paribus coalitis, basi."—" *Epacris microphylla*; Br. Prodr. Flor. Nov. Holl. calycis foliolis obtusiusculis, tubum corollæ æquantibus; foliis cordatis, acutis, pedunculum superantibus, lateribus erectis; spica apiciflora; ramulis pilosis."—" *Fritillaria ruthenica*; Wickstrom? caule subunifloro; foliis lineari-lanceolatis, imis superioribusque subternatis, illis obtusis, his, intermediisque sparsis, cirrhosis; floribus tessellatis cernuis.

The Magazine of Natural History. Conducted by J. C. LOUDON,
Vol. ix. Nos. from May to August. (Continued from p. 101.)

I. Zoology.

Wood on the Propriety of altering established Scientific Names in Natural History should they be erroneous, p. 337-342.—WHITE on the Singing of Birds, p. 281-290; and at p. 432, there is a review of this paper by Mr CONWAY.—

WHITE on the length of Life of a species of Parrot ; with suggestions for ascertaining the average period of existence of the whole animal creation ; and an anecdote on a parrot, p. 347-350. The parrot appears to have died in not less than its 85th year.—BLYTH on the various seasonal and other external changes which regularly take place in birds, more particularly in those which occur in Britain ; with remarks on their great importance in indicating the true affinities of species ; and upon the Natural System of arrangement, p. 394-409.—WATERTON on the Habits of the Magpie, p. 225-9 ; of the Dovecot Pigeon, p. 343-6 ; and of the Stormcock or Mistletoe Thrush, p. 409-13.—MORRIS on the Habits and personal characteristics of the Crossbill, p. 413-16.—WATERTON and MORRIS on the office of the gland upon the rump of birds, p. 266-271 ; 323-26 ; 434-7. The discussion has been carried on in a flippant and acrimonious manner creditable to neither party, and very unsatisfactory to a naturalist in search of the truth. We need not, however, hesitate, to express our belief that Mr W. will be found to be correct in his opinions.—SALWAY'S notice of the discovery of the Skeletons of Swifts and Starlings in the tower of the church at Oswestry, Shropshire.—HOY on the capture of the *Motacilla neglecta* at Stoke Nayland, Suffolk.—ORD on the Habits of the Black snake.—WATERTON on the Habits of the Chegoe of Guiana, p. 290-293 ; to which the editor has judiciously appended a translation of Pohl and Kollar's account of the *Pulex penetrans*, by Mr SHUCKARD, with some excellent illustrative figures.—JOHNSTON on the *Acarus Basteri*, p. 353 ; *Lamellaria tentaculata*, p. 229 ; *Asterias aranciaca*, p. 298 ; *Ast. endeca*, p. 299 ; *Ophiura Rosula*, p. 231 ; and *Gordius aquaticus*, p. 355.—TEMPLETON'S Catalogue of the Annulose Rayed and Polypous animals found in Ireland, as selected from the papers of the late J. Templeton, Esq. with localities, descriptions, and illustrations, p. 233-240 ; p. 301-5 ; p. 417-421. The *Actinia monile* of Templeton is the young of *Act. senilis* ; and his *Actinia margaritifera* is the common *Act. mesembryanthemum*.

II. Botany.

BABINGTON'S Localities of several species of British plants observed during the summer of 1835, p. 243-246.

Entomological Magazine. London, July 1836. (Continued from p. 192.)

With this number a fourth volume is commenced, to which we wish success, as it is a publication valuable on many accounts to the entomologist, but particularly so, for the various monographs it contains. It is prefaced by a short introductory address, and the minutes of the Entomological Club, the members of which association, in consequence of the valuable property they have acquired in collections of insects, books, and manuscripts, have found it necessary to frame an institution and code of laws. Among the resolutions we are glad to observe that a special object of the club is to form a model named-cabinet of insects, unquestionably British, and another, that all entomologists consulting the library or Cabinet shall be at perfect liberty to make notes, memoranda, descriptions, or drawings of any insect, or from any book, or manuscripts contained therein. Art. 1. FRANCIS WALKER, Monographia Chalciditum, (continued from Vol. iii. p. 496.)—2d. Wanderings and Ponderings of an Insect-hunter.—3d. A. H. HALIDAY, M. A. Essay on Parasitic Hymenoptera, (continued from Vol. iii. p. 147.)—4. Observations on certain curious indentations in the old red sand-

stone of Worcestershire, and Herefordshire, &c. by JABEZ ALLIES, Esq. one of the council of the Worcestershire Natural History Society, &c.—A critique on a work we have not seen, and unconnected with Entomology.—5. New group of Orthoptera, Family Mantides, by M. A. LE FEBVRE, (extracted from the *Annales de la Société Entomologique de France*.) The curious insect here noticed was found by the author in the Egyptian deserts, where no other insect upon which it might prey could be detected, and where the desert is entirely devoid of vegetation.—6. A list of the Coleoptera, taken in the county of Sutherland in June 1834, by Mr J. WILSON, F. R. S. E. &c.—7. Entomological notes, by W. E. THUCKARD. Among these an instance of curious hermaphroditism, or rather monstrosity, in *Anthophora retusa*, Linn. the captive of *Hy-lecæus dermestoides*, Fab. in Sherwood Forest, and *Carabus intricatus* upon Horsley Downs.—8. List of Entomological works.—9. Varieties.

Companion to the Botanical Magazine. By SIR W. J. HOOKER, Professor of Bot. in the Un. of Glasgow. Parts xiii. xiv. (commencing Vol. ii.) 8vo. Curtis, London, 1836.

We take the opportunity of the commencement of a second volume of this work, to begin our regular notice of the contents; and to those who are acquainted with the “Botanical Miscellany,” and the “Journal of Botany” by the same author, of which it is a continuation, it is needless to say more than that it is a worthy “companion.” It commenced twelve months since, and is intended to contain “such interesting botanical information as does not come within the prescribed limits of the Magazine;” that is, Curtis’s Botanical Magazine; and it can be procured either as a separate monthly periodical, or stitched up under the same cover with that work.

No. xiii. commences with “botanical information,” from a part of which we learn that Mr George Gardener sailed on 20th of May last from Liverpool for Rio de Janeiro, with the intention of travelling in South America as a botanical collector. “The Organ Mountains, so rich in orchideous plants, will probably be the spot where he will commence his researches; but the chief field of investigation will not be fixed till his arrival in Brazil. Preference will be given to those parts of South America which have been the least explored, and the names of such botanists as intend taking collections of specimens from him at the moderate rate of L. 2 the hundred species, is already considerable, so that we have every reason to believe he will meet, in the fullest extent, with the encouragement to which his great enthusiasm so justly entitles him. The specimens ticketed in all the collections will be marked with corresponding numbers, which numbers will be referred to when the lists of the species come to be published; as they will be with all convenient speed. Mr Gardener, shortly before his departure, published “*Musci Britannici*,” or pocket Herbarium of Species of British Mosses, containing a collection of from 200 to 250 species. A few copies remain still for sale in charge of Mr Murray, curator of the Glasgow Botanical Garden.—Synopsis of the Hemimerideæ, a tribe of the Scrophulariaceæ, by George Bentham.—*Lacis ceratophylla*, with a figure, (the *Podostemum ceratophyllum* of Michaux,) a very singular plant, growing and flowering under water, attached to the stones at the bottoms of the North American rivers. Dr Hooker, in his description of this plant, of which he has now for the first time received perfect specimens, remarks, the “spatha contains what is usually considered as a single

flower, but which I am rather led to consider as two, a *male* and *female*, at the extremity of a peduncle, so short as to be mostly included within the ruptured spatha."—*Erythroxylon coca*, or coca shrub of Peru. A figure of the plant is given with a description, intended as a supplement to a paper from the travels of Dr Pöppig, relating to the uses, property, and mode of cultivation of the shrub, p. 161 of Vol. i.—A monograph of the North American species of *Rhynchosporæ*, by Asa Gray, M. D. from the Annals of the Lyc. of Nat. Hist. N. York.

No. xiv. continues and completes Mr Gray's *Rhynchosporæ*; 30 species are described.—On the Esculent Plants of Van Diemen's Land, taken from the Van Diemen Almanac for 1834 and 1835, published anonymously, but due to James Backhouse, Esq. A short but interesting paper, and we should like to see a little of something similar introduced into the provincial Almanacs of Britain, instead of the ridiculous tales with which they are so frequently concluded.—*Pteris esculenta*, bearing the place in the pastures of our *P. aquilina*, is one of the most abundant, commonly used by the natives, and nutritive from the quantity of arrow-root contained in its roots, which creep horizontally, and when luxuriant are about the thickness of a man's thumb.—*Agaricus esculentus* is abundant in the island, and considered identical with the species in Europe.—Contributions towards a Flora of South America, by Sir W. J. Hooker and G. A. W. Arnot, Esq. continued from Vol. i.—Observations on some new or little known genera and species of *Scrophulariaceæ*, by George Bentham, Esq.—Notice concerning the late Mr Drummond's collections, made chiefly in the southern and western parts of the United States, continued from Vol. i.

TRANSACTIONS AND PERIODICALS—Foreign.

Annales des Sciences Naturelles. Zoologie, MM. AUDOUIN et MILNE-EDWARDS. *Botanique*, MM. AD. BRONGNIART et GUILLEMIN, (From page 196.) Crochard & Co. Paris, Mars 1836. (Continued from p. 193.)

1. Zoology.

AUDOUIN, *Concernant des calculs trouvés dans les canaux biliares d'un Cerf-Volant femelle*, (*Lucanus capreolus*,) adressé à l'Académie des Sciences, le 7 Décembre 1835.—On dissecting a female of *Lucanus capreolus*, two little calculi were found by Dr Aubé, in the slender biliary vessels, attached to the alimentary canal. These vessels entomologists in general have agreed to consider as subservient to the secretion of bile, as indeed their name implies, but some peculiarities in their mode of insertion into the intestines, in various insects, had led some of the most distinguished comparative anatomists to doubt the truth of this theory, and to offer other conjectures relative to their functions. The calculi above-mentioned being sent to Audouin, he immediately perceived how they might be made to illustrate this question. One of them was carefully analyzed, and it was ascertained to be composed of *uric acid*;—hence it follows, that the biliary vessels are in fact urinary organs. However, says Audouin, I am not unwilling to admit, as Meckel had conjectured, that these vessels of insects are at the same time both urinary and hepatic, not forgetting that some physiologists have proved, by a series of experiments and ingenious inferences, that

the bile is not indispensable or even adjuvant to the act of digestion. This point being granted, we may conceive that it is of little consequence whether the urino-biliary-vessels open behind the stomach, in some parts of the intestinal tube, or even immediately at the anus, as we find is the case. In a note appended to this letter, Audouin gives a succinct history of the opinions of previous anatomists relative to the functions of the vessels in question.—A continuation of the translation of BRANDT's *Remarques sur les nerfs stomato-gastriques ou intestinaux, dans les animaux invertébrés*.—*Description d'empreintes de pieds d'Oiseaux dans le Grès rouge du Massachusetts, par E. HITCHCOCK*. A translation from Silliman's American Journal of Science, of a peculiarly interesting paper to all geologists and zoologists.—BRANDT, *Conspectus sectionum, generum, sub-generum et specierum novorum, quæ in fasciculo primo Prodrömi descriptionum animalium a Mertensio in orbis terrarum circumnavigatione observatorum reperiuntur*.—ANALYSE des travaux Anatomiques, Physiologiques et Zoologiques présentés à l'Académie des Sciences pendant le mois de Mars 1836. There is nothing in these notices of sufficient importance to call for an extract of them. At their conclusion there is announced a new edition of the "Règne Animal," preparing for publication, to be illustrated with numerous plates engraved with every care, and containing a figure of the typical animal of every genus; as well as plans of the anatomy of the ordinal and classical sections. In what material respects the work is to differ from the "Iconographie du Règne Animal" of M. Guérin does not appear very evident.

II.—Botany.

Anatomie d'une branche de Pinus Strobus, par M. LINK. A paper worthy of the distinguished reputation of its author, and which will enable the geologist to determine, with comparative facility, the true nature of those fossil woods, which have been supposed to be the remains of the Coniferæ of a former world.—*Bougueria, novum Plantaginearum genus, auct. J. DECAISNE*. A genus between *Plantago* and *Littorella*, allied to the former in habit, to the latter in the structure of the capsule. The only known species (*B. nubicola*) was discovered by d'Orbigny in Bolivia, growing in fissures of porphyritic rocks on the snow mountains, called *las lagunas*, far overtopping the city *Potosi*.—*Recherches sur l'élévation de la température du spadice du Colocasia odora (Caladium odoratum), faites dans le jardin botanique d'Amsterdam, par. G. VROLIK, et W. H. DE VRIESE*.—KOCK's *Description des Orobanches de la Flore d'Allemagne* is concluded in this number.—SPACH, *Hypericacearum monographiæ Fragmenta*. Native *Hypericum elodes* is found to have, as its peculiar habit might have led one to anticipate, sufficient differential characters to become the type of a new genus. It is the *Elodes palustris* of Spach, and no other species is known.—*Notice sur l'Ambrosia maritima Linne, par. M. LEON DEFOUR*.—*Bryologie d'Europe publiée en monographies, par MM. BRUCH et SCHIMPER*. A review of the first part of the French edition. The book is very highly lauded. The part published contains the *Burbaumiacées* and the *Phascacées*. MM. Bruch and Schimper remark, that in the *Muscologia Britannica* the description of the *Phascum alternifolium* applies in part to the *Archidium phascoides*, a species very different, although it has been often confounded with the former. It is easy to avoid this error by comparing the sporules of these two mosses: they are very

small and very numerous in the *Ph. alternifolium*, but very large, and consequently few in number, in the *Archidium*.—*Animadversiones botanicae nonnulla novorumque generum et specierum diagnoses*, auct. F. E. L. FISCHER et C. A. MEYER — *Septième Notice sur les plantes rares du Jardin de Geneva*, par MM. A. PYR, et ALPH. DE CANDOLLE.

Archiv für Anatomie, Physiologie, und Wissenschaftliche Medicin, &c. Von Dr JOHANNES MÜLLER. G. Eichler. Berlin, Heft. ii. 1836. 8vo. (Continued from p. 196.)

This number contains an article on the Anatomy of Fishes by Henry Rathke. During a scientific tour in the southern provinces of the Russian empire, performed in 1833, the author had an opportunity of making observations on the internal structure of thirty-six species of fish, which he procured along the shores of the Black Sea. He has given a brief but very accurate account of the generative organs of several of these species, and he intends in four or five subsequent numbers, to detail in order the anatomy of the urinary vessels, the swimming bladder and alimentary canal, and the circulating system. These memoirs are intended as a brief continuation of the description of the same organs in the fishes of the north of Germany, already published by the author, partly in his Contributions to the History of the Animal Kingdom, (Part 2) and partly in Meckel's Archives for 1826. There is also an elaborate paper by the same author on the generation of the Decapods, founded principally on an examination of fourteen species inhabiting the Black Sea, which he procured at the same time as the fishes before-mentioned. He also announces the publication, in the course of a few weeks, of a work in which the subject is treated more at large.—A paper by Dr Pockels of Brunswick on the gestation of the Roe (*Cervus Capreolus*) accompanied by an engraving, gives the result of a very accurate examination of the uterus from the time of impregnation till the fœtus had attained the length of from three to three and a-half inches. He proves by this investigation, that, contrary to the received opinion, the ovum remains dormant in the ovarium during a period of five months. The rutting season continues from the end of July till the end of August, but the developement of the ova does not commence till December, by the end of January the embryo had attained the length above specified.—The number concludes with two letters from Mauro Rusconi, (addressed to Professor E. H. Weber) in answer to the critique of M. von Baer, upon his history of the developement of the spawn of frogs. These letters are illustrated by two plates showing the successive changes which the spawn undergoes. The points which Rusconi endeavours to establish are briefly these: That the skin and the slimy matter which surrounds the egg, do not contribute towards its development; that the egg of the frog differs from that of birds, inasmuch as the cicatricula is wanting, from which point the vivifying process commences. The punctum saliens in the egg of the frog is the whole yolk, which by degrees changes into the larva. This change is hastened or retarded, according to the temperature of the water in which the egg is deposited. That the semitfluid material of the yolk changes into a bag of little globules, or elementary molecules, before the organization begins. That the skin is the first part of the larva that becomes organized; then follow in succession the spinal chord, the brain, the aorta, the muscles of the back, the peritoneum, the heart, the liver, and lastly, the alimentary canal.

INTELLIGENCE.

ZOOLOGICAL INFORMATION.

Alcyonella Stagnorum. (Abstracted from Mr Teale's Paper.)—From the beginning of August to the middle of November in 1835, the *Alcyonella* was found in great abundance in a small pond, excavated from a bed of ferruginous clay, in a garden near Leeds, having never before been observed in this locality or in this district. The *Polypiferous masses* are round, sublobulated and botryoidal, incrusting stones, leaves, twigs, earthen-ware, and garden utensils, which have been accidentally deposited in the pond. The size varying from a thin incrustation to masses of several inches in circumference, one specimen weighing 17 ounces, and being $14\frac{1}{2}$ inches in circumference; the surface presenting numerous subpentagonal apertures, closed by a translucent polypiferous papilla; the vertical section of the mass exhibiting numerous tubes, radiating from a central nucleus, and in their course giving off lateral branches, which being placed in apposition to the original tubes increase the size of the mass as the tubes proceed from the centre. The *Papilla and Polype*.—Each tube is closed by a conical papilla, from which is protruded an expansion of near fifty linear, slightly recurved tentacula, forming an unbroken series or circle, depressed at one side into a horse-shoe form; in the bottom of this horse-shoe crater, within the circle of tentacula, is situated a mouth, towards which animalcules and other particles of matter are seen, with the microscope, to be rapidly driven by the currents, excited along the surfaces of the protruded tentacula. *Digestive apparatus*.—The mouth communicates below with a short œsophagus, soon expanding into a tubular stomach, which after a short course is abruptly turned upwards, and diminishing in size forms a straight intestine, which terminates externally to the crater formed by the tentacula. *Ovaries and Ova*.—Attached to the papilla is a tubular membrane occupying the whole length of the canals of the polypiferous mass. These tubes or ovaries contain numerous ova of an oval form, being of a dark brown colour, having a horny investment, the immature ova being white, translucent, and of small size. The ovary at its junction with the papilla is closed, the ova escaping after the death of the animal, by decomposition of their containing membrane.

The *Alcyonella*, I believe, is an animal but little known in this kingdom, and, as far as I have been able to ascertain, has not been recorded as a British animal, unless the opinion of Raspail be correct, that *Cristatella* and *Plumatella* are identical with it, but in different stages of development, or developed under different circumstances.

The animal was first observed by M. Rose in the pond of Bagnolet near Paris, and was sent by him to Bruguière for description in the *Encyclopédie Méthodique*. He describes the polype as composed of from 15 to 20 filiform tentacula, each terminated by a rounded head, arranged in an incomplete circle in a single series. His plate accords with this description. Lamarck, after having examined living specimens, approved of and preserved the characters assigned to it by Bruguière; and Lamouroux, after examining the living animal, considered the

plate of Bruguière so faithful, that he could not render to science a better service than to copy the plate of the latter. After this time the same description was adopted by most zoologists in various countries of Europe, until M. Raspail, in his beautiful and elaborate essay in the fourth volume of the *Memoires de la Société d'Histoire Naturelle*, pointed out the errors of his predecessors, and showed that the polype of *Aleyonella* contains not less than forty-four tentacula: That the circle of tentacula is complete, surrounding the mouth, but depressed into a horse-shoe form, and not constituting an incomplete circle, as stated by Bruguière, Lamouroux and others. That the tentacula are linear, not terminated by a rounded button as represented by Bruguière and Lamouroux, and sanctioned by Lamarck. The error respecting the button-like extremities of the tentacula appears to have arisen from the examination having been made with only moderate magnifying powers. If examined with a common pocket lens, of $1\frac{1}{2}$ inch or even $\frac{3}{4}$ inch focus, the tentacula appear to be terminated by a rounded knob. This, however, is merely an optical illusion, from the recurved state of the extremities of the tentacula. Their linear form throughout becomes immediately obvious on examining them with higher magnifying powers. For this purpose it is easy to detach an entire living polype, and examine it when expanded in a watch glass, with a lens of $\frac{1}{10}$ of an inch focus. Single tentacula may be detached and examined by still higher magnifying powers ($\frac{1}{30}$ of an inch) when the cilia upon their surface become distinctly visible.—T. P. TEALE.

Sparus aurata, Jenyns's Brit. Vert. Anim. p. 353.—The description of this fish has been so mixed up with that of the *Pagellus centrodontus* by British ichthyologists, and it is apparently so very rare in our seas, that Mr Jenyns doubts whether it has really any claim at all to a place in our Fauna. I am able to remove this doubt satisfactorily, having in my possession a specimen of the fish, which was taken at the mouth of the Tweed in the month of May last. The fishermen inform me that they usually procure three or four specimens during the season. The one I have measures 18 inches in length, including the tail; and there is not the faintest appearance of the "longitudinal golden-coloured bands on the sides," so particularly mentioned by Mr Yarrell, and shown in his figure, but in other respects it agrees very well with the description.—G. J. Mr Yarrell's figure is taken from the work of Cuvier and Valenciennes.

Clupea alba.—The white bait has been observed by Dr Parnell in abundance in the Solway Frith, in June last. This is another Scotch locality for this little fish, and it is probable that its distribution will be found to be more extended than generally supposed, its small size being conducive to its concealment, except to the ichthyologist who examines the waters for himself.—R. P.

Cetonia aurata.—This fine insect, abundant in England, was observed in great numbers in one locality on the west coast of Galloway, by Dr Graham and Mr Scott in August last. The situation is close to the sea, and the spot in which the insect was found of very limited extent, and surrounded by precipitous rock. In every instance the insect was resting on the flowers of *Angelica sylvestris*. Eight specimens were taken, and are in the possession of Dr Greville.—R. K. G.

Bufo calamita.—This little toad is abundant on the shore of the Solway Frith, at Saturness point, Galloway. The principal locality is near the village

of the same name, extending for half-a-mile on each side along the coast, which is there low and sandy, and covered with marine grasses. During the day it lurks beneath stones, forming a small cavity for the reception of its body, and towards the dusk of evening may be seen sallying forth from concealment in numbers along the beach, apparently in search of the insects which occur among the rejectamenta. They spawn gregariously in the pools of an adjacent marsh, or salt marsh, and at this period (about the end of June and commencement of July,) are extremely noisy, uttering in concert a continued croak. We are not aware that any other Scotch locality for this species has been recorded.—W. J.

Parasitic Larvæ.—M. Leon Dufour has presented to the Royal Academy of Sciences at Paris, an Essay on the Entozoa and parasitic Larvæ peculiar to the Hymenoptera and Orthoptera, which contains some curious facts. The most remarkable regards a parasite in the *Andrena aterrima*. This larva establishes itself upon the large trachean vesicle, which may be observed at the base of the abdominal cavity. It is there fixed by means of two similar trachean tubes, which afterwards branch, or are ramified on its body, and this double trachea is evidently furnished by the large vesicle of which it is a continuation. We have thus two nutritive tubes dependent on the large air vesicle of the *Andrena*, which go to form the whole respiratory organ of the parasite, that is, the most essential apparatus for the maintenance of its existence, and the life of the larva is thus doubly dependent on that of the *Andrena*, which not only furnishes the quantity of air necessary for respiration, but it provides at the expense of its own substance the organs destined for the circulation of this vital fluid.—Inst. 1836. p. 214.

BOTANICAL INFORMATION.

Dr Graham's Excursion to examine the Botany of the Shores of Galloway in August 1836.—The party met by appointment at Stranraer on the morning of the 1st of August, and in their first walk crossed the peninsula separating Loch Ryan from the Irish channel at Lochnaw Castle. They then walked along the coast for a little way to the northward, recrossed the peninsula, and returned to Stranraer. They then passed by Stoneykirk to Sandhead, and along the shore by Drummore, round the Mull of Galloway to the station where last year *Ononis reclinata* was found to the northward of West Tarbet. Thence they returned along the southern shore to Glenluce, and passing by Port William, Glasserton, Burrowhead, Whitehorn, Whitehorn Isle, and Garlieston, reached Wigton, where the party broke up on the 9th of August. To this point the greater part of the coast was pretty carefully examined; also subsequently by Dr Graham in the neighbourhood of Kirkcudbright and Balmaehead.

The weather was extremely hot and dry during the whole time, with the exception of the 1st August, when there were a few slight showers; and of the 3d, on which a good deal of rain fell. No new plant was added to the British Flora; but *Erodium maritimum*, to the northward of Port William, and *Jungermannia Mackaii*, near Drummore, were for the first time observed to be natives of Scotland. *Scirpus Savii* was found in much larger quantity than last year. *Bartsia viscosa*, and *Carum verticillatum*, not observed last year, were gathered this, the former between Port William and Glasserton, the latter near Wigton, and between Gatehouse and Kirkcudbright. In many places along the coast, between Glasserton and Balmaehead, *Genista tinctoria* grows in great profusion;

and *Artemisia maritima* was found abundantly at Burrowhead, near Cragleton Castle, and at St Mary's Isle, more sparingly in a few other places between the first and second stations. The neighbourhood of Kirkcudbright is quoted as a Scotch station for *Lathyrus latifolius*. It was accordingly found abundantly in the woods at St Mary's Isle, but it is known certainly to have been introduced many years ago. *Solanum nigrum*, which is by no means a common plant in Scotland, and perhaps only occurs where introduced, was observed in dense masses growing in the neighbourhood of Sandhead, and to the northward of Port William, on three or four spots where sea-weed had formerly been laid up to dry.

The pools were examined on the whole route, and inquiry made everywhere for *Cladium mariscus*, but no trace of it was seen or heard of; and a suspicion necessarily arose regarding the correctness of a statement, that the plant is abundant in Galloway. Does it exist there at all? Has Galloway been inadvertently substituted for Galway? There it does grow.—R. G.

Calothrix distorta, Hook. Br. Flor. ii. 369.—This pretty and rather rare Algae was found by Mr Selby and myself in Newham Lough, August 15, 1836. It is a new acquisition to the Flora of Northumberland.—G. J.

Jungermannia Machaili.—This plant was observed growing on some rocks by the sea side near Drumore, Galloway, in the month of August last. It is a rare species, confined to the British Islands, and no Scottish station for it has been hitherto placed on record.—R. K. G.

The genus Rubus.—In Koch's *Synopsis Floræ Germanicæ et Helveticæ*, recently published, the species of this most difficult genus are reduced to five, viz. *R. Ideus*, *fruticosus*, *cæsius*, *saxatilis*, and *chamæmorus*. The number of species in the *British Flora* is thirteen. The German and Swiss roses are all referred by Koch to seventeen species.—R. K. G.

The genus Adoxa.—This plant, referred by some botanists to *Saxifrageæ*, by others to *Araliaceæ*, is placed by Koch among the *Caprifoliaceæ*. He observes that it is closely allied to *Sambucus* in the parts of fructification.—R. K. G.

A list of Mosses, Lichens, and Algæ of the "Flora Hibernica," not hitherto described as British.

I. MUSCI.

1. *Gymnostomum tortile*, Schwægr.
2. *Glyphomitrium cylindraceum*, Taylor.

II. HEPATICÆ.

3. *Jungermannia calycina*, Taylor.
4. *Jungermannia microscopica*, Taylor.

III. LICHENES.

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| 5. <i>Bæomyces microcephalus</i> , Taylor. | 11. <i>Verrucaria lucens</i> , Taylor. |
| 6. <i>Verrucaria conferta</i> , <i>Ibid.</i> | 12. ———— <i>rubiginosa</i> , <i>Ibid.</i> |
| 7. ———— <i>byssacea</i> , Ach. | 13. ———— <i>irrigua</i> , <i>Ibid.</i> |
| 8. ———— <i>immersa</i> , Hoffm. | 14. ———— <i>fissa</i> , <i>Ibid.</i> |
| 9. ———— <i>viridula</i> , Ach. | 15. ———— <i>gemmifera</i> , <i>Ibid.</i> |
| 10. ———— <i>lithina</i> , Ach. | 16. ———— <i>circumscripta</i> , <i>Ibid.</i> |

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| 17. <i>Verrucária peripherica</i> , <i>Taylor</i> . | 42. <i>Lecidea fumosa</i> , <i>Ach</i> . |
| 18. ———— <i>umbrosa</i> , <i>Ibid</i> . | 43. ———— <i>recedens</i> , <i>Taylor</i> . |
| 19. ———— <i>mollis</i> , <i>Ibid</i> . | 44. ———— <i>stellulata</i> , <i>Ibid</i> . |
| 20. ———— <i>erysiboda</i> , <i>Ibid</i> . | 45. ———— <i>premnea</i> , <i>Ach</i> . |
| 21. <i>Endocarpon rufo-virescens</i> , <i>Ibid</i> . | 46. ———— <i>scabra</i> , <i>Taylor</i> . |
| 22. ———— <i>sulphureum</i> , <i>Ibid</i> . | 47. ———— <i>pulvinata</i> , <i>Ibid</i> . |
| 23. ———— <i>macrocarpa</i> , <i>Ibid</i> . | 48. ———— <i>Templetoni</i> , <i>Ibid</i> . |
| 24. ———— <i>rugosum</i> , <i>Ibid</i> . | 49. ———— <i>geomæa</i> , <i>Ach</i> . |
| 25. <i>Porinâ fallax</i> , <i>Ach</i> . | 50. ———— <i>lapidicola</i> , <i>Taylor</i> . |
| 26. <i>Syncesia albida</i> , <i>Taylor</i> . | 51. ———— <i>picta</i> , <i>Ibid</i> . |
| 27. <i>Arthonia ilicina</i> , <i>Ibid</i> . | 52. ———— <i>fuliginosa</i> , <i>Ibid</i> . |
| 28. <i>Opegrapha sulcata</i> , <i>Pers</i> . | 53. ———— <i>latens</i> , <i>Ibid</i> . |
| 29. ———— <i>saxigena</i> , <i>Taylor</i> . | 54. <i>Lecanora multipuncta</i> , <i>Ach</i> . |
| 30. <i>Collema cristatum</i> , <i>Hoffm</i> . | 55. ———— <i>involuta</i> , <i>Taylor</i> . |
| 31. ———— <i>synalissum</i> , <i>Ach</i> . | 56. ———— <i>varia</i> , <i>Ach</i> . |
| 32. ———— <i>glomerulosum</i> , <i>Ach</i> . | 57. ———— <i>minuta</i> , <i>Ach</i> . |
| 33. ———— <i>fragile</i> , <i>Taylor</i> . | 58. ———— <i>albo-flavida</i> , <i>Taylor</i> . |
| 34. <i>Variolaria constellata</i> , <i>Ibid</i> . | 59. ———— <i>linearis</i> , <i>Ibid</i> . |
| 35. ———— <i>corallina</i> , <i>Ach</i> . | 60. <i>Parmelia horrescens</i> , <i>Ibid</i> . |
| 36. ———— <i>polythecia</i> , <i>Taylor</i> . | 61. ———— <i>columnaris</i> , <i>Ibid</i> . |
| 37. ———— <i>torta</i> , <i>Ibid</i> . | 62. ———— <i>sulcata</i> , <i>Ibid</i> . |
| 38. ———— <i>chlorothecia</i> , <i>Ibid</i> . | 63. ———— <i>rugosa</i> , <i>Ibid</i> . |
| 39. ———— <i>terricola</i> , <i>Ibid</i> . | 64. ———— <i>adglutinata</i> , <i>Flærke</i> . |
| 40. <i>Lecidea macula</i> , <i>Ibid</i> . | 65. ———— <i>reticulata</i> , <i>Taylor</i> . |
| 41. ———— <i>melastigma</i> , <i>Ibid</i> . | 66. <i>Sticta ciliata</i> , <i>Ibid</i> . |

IV. ALGÆ.

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| 67. <i>Sporachnus Cabzeræ</i> , <i>Ag</i> . | 70. <i>Griffithsia simplicifolium</i> , <i>Ag</i> . |
| 68. <i>Polysiphonia thuyoides</i> , <i>Harv</i> : | 71. <i>Conferva nuda</i> , <i>Harv</i> . |
| 69. ———— <i>cristata</i> , <i>Ibid</i> . | |

MISCELLANEOUS INFORMATION.

Sixth Meeting of the British Association for the Advancement of Science.

President,—Professor Henslow.

Vice-Presidents,—Rev. F. W. Hope, Dr J. Richardson, Professor Royle.

Secretaries,—John Curtis, Esq.; Professor Don; Dr Riley; S. Rootsey, Esq.

Committee,—W. Yarrell, Esq.; Rev. L. Jenyns; T. Mackay, Esq.; C. C. Babbington, Esq.; Professor Nilsson (*of Lund*); Hon. Ch. Harris; Rev. — Phelps; Richard Taylor, Esq.; T. C. Eyton, Esq.; J. E. Bowman, Esq.; W. C. Hewitson, Esq.; Dr Scouler; Dr Jacob; Rev. — Ellocombe; G. J. Jeffries, Esq.; R. M. Ball, Esq.; Colonel Sykes; J. L. Knapp, Esq.; N. A. Vigors, Esq.; E. Forster, Esq.

The proceedings of this Section were continued during Monday, Tuesday, Wednesday, and Thursday. On Friday the members separated for the purpose of making various excursions, to explore the Natural History of the neighbourhood. Much interesting matter was brought forward and discussed, of which we cannot pretend to give a very minute detail. Dr Richardson's Report on the Zoology of North America was prepared at the request of the Association, and will be printed at full length in their Transactions for the current year. We

cannot here do more than give a very brief summary of the principal facts detailed, without making any reference to the authorities to whom the Doctor referred, but which will of course be mentioned in the report. This report was read in three portions, on three separate mornings, but we prefer giving the whole of it together, as though it had occupied only one sitting. With this exception, the proceedings of the Section will be referred to the several days on which they took place.

Monday, August 22d.—Dr Richardson's Report.

Notwithstanding the ravages which have taken place among the various tribes of animals in North America, as the progress of civilization has advanced from east to west, it is still highly probable that no single species has yet become extinct, and the colonist has still the means within his reach of studying the habits of every indigenous animal. As the genera of European and North American animals are for the most part the same, whilst a very great dissimilarity subsists between the species peculiar to the two continents, this affords considerable facility for promoting inquiries into the geographic distribution of particular types of animals. The observations of Dr Richardson in this report were confined to the distribution of the Mammalia and Aves; and chiefly those which were inhabitants of the western parts of North America, including New Mexico, the Peninsula of Florida and California, down to the well-defined limits of the South American zoological province. Dr Richardson then entered at considerable length into the description of the physical structure of the country under consideration, pointing out the more direct means of communication by transverse valleys, the course of streams, or extensive prairie lands, along which the quadrupeds, birds, or fish of distinct parts were enabled to perform their respective migrations; and he stated the great probability of a more complete interchange of the fish one day occurring, so soon as the several canals already projected, or in progress, should be completed. The eastern coast, at least in the more northern latitudes, has a decidedly lower mean temperature than the western, or than that of the eastern parts of Europe under the same parallels of latitude. In consequence of this, the migration of the birds is here more general than under the same parallels in Europe. Dr Richardson then entered upon several details connected with the subject of temperature.

Geographic Distribution of the Mammalia.—Although there exists a great general similarity between the Mammalia of Europe and North America, these latter are widely different from those of the southern Fauna of the new world. The line of demarcation between these zoological provinces does not occur at the Isthmus of Darien, but at the tropic of Cancer. Dr Richardson then detailed the particular results of his inquiries under the several orders of this class, from which we cull the following remarks as among the most interesting.

Quadrumana.—Although one species of this order is found in Europe as far north as latitude 36°, none occur in America to the north of the Isthmus of Darien.

Carnivora.—The sixteen bats of North America are peculiar, but in all probability there are many more to be discovered. Only two of them have been yet traced over any great extent of country.

There are ten species of Insectivora, and in this family the North American Mammalia differ more from the European than in any other of the Carnivora. There are three European genera, which do not exist in North America, and the

only three genera found in North America are not met with in South America. The species of North American *Sorex* very closely resemble those of Europe.

The Marsupialia, so eminently characteristic of New Holland, and also abundant in South America, have only three representatives in North America; and two of these reach no higher than Mexico; but the Virginian opossum ranges from Paraguay to the great Canadian lakes.

The family Carnivora contains about forty species, many of which are also met with in Europe, unless a closer examination shall hereafter enable naturalists to distinguish some of those which are now considered to be identical. With the exception of a very few genera belonging to the South American group the rest are all common to Europe also.

In the Plantigrada, there are four bears, two of which are peculiar to the new world, one of them ranging farther to the north than any other quadruped. Cuvier considers the wolverine as identical with that of Europe. The *Mustela* do not range farther to the South than the northern or middle provinces of the United States. It is very uncertain whether any of this genus are identical with those of Europe. There are three otters, and one of them seems to be identical with our own, whilst the *Lutra Brasiliensis*, if truly North American, is equally an inhabitant of the Arctic sea, and a great part of South America. Eight species of *Canis* have been described, but there is great difficulty in discriminating them, as well as in identifying any of them with those of Europe. There are also eight species of *Felis*, some of which, however, are uncertain, and three range from South America into the South Western States. There are nine species of *Amphibia*, which mostly range through the northern seas of both the old and new worlds. The genus *Otaria* is peculiar to the North Pacific, but is found on the Asiatic coast, as well as on that of North West America.

Rodentia.—This order is eminently characteristic of North America, which contains more species, and a greater variety of distinct forms than any other part of the world. Between seventy and eighty are already known. The squirrels are as yet very imperfectly determined. The marmots are abundant, and only one of them is probably common to Europe. There is one only of the restricted genus *Mus*, which is certainly indigenous, and this closely resembles our *M. sylvestris*.

Edentata.—The fossil *Megatherium* and *Megalonyx* are dispersed through both the continents of America, but only three or four living species of this order belong to North America. The order itself is peculiarly characteristic of South American zoology.

Pachydermata.—This order is rich in fossil species, which in America are more than twice as numerous as those now living, and these do not amount to more than three or four species, and are found both in North and South America. Fossil bones of the horse occur at Kotzebue's Sound, though the present race of this quadruped has been undoubtedly imported. Remains of fossil elephants and mastodons are met with in the most northern regions.

Ruminantia.—Of thirteen species of this order already ascertained to inhabit North America, two are common to Europe, and have a high range. The deer are very imperfectly determined; but the rein-deer proceeds south, as far as Columbia river on the west, and New Brunswick on the east. The musk-ox, so abundant in the north, is not found either in Greenland or Asia.

Cetacea.—Some of these, as the seals, are very imperfectly determined.

Most of the species on the east coast appear to be common to Europe, those on the west are also found in Asia. About nine in all have been described as North American.

AVES.—Dr Richardson professed not to enter very fully into details respecting the different orders of birds, as the species were generally much more known than those of the Mammalia. Many of them being migratory, quitted the less accessible countries at stated periods of the year, and in passing through those tracts which were comparatively civilized, afforded the naturalist an opportunity of studying their habits. Their geographical distribution was still very imperfectly known, from the want of local lists, more especially in California and Russian America. About 500 species were now described, nearly one-fourth of which were common to Europe, and about one-eighth to South America. Of those common to North America and Europe, there were 39 land-birds, 28 waders, and 62 water-fowl. Several genera were confined to North America, but only two families, the Trochilidæ and Psittacidæ, were absent from Europe. The birds of prey in general have an extensive range, some of the North American species being found in the most distant parts of the world, others extend through South America, nearly half of them are common to Europe, if we except the vultures, of which those in the new world are peculiar to that country. Except the Corvidæ, of which one-fourth are also common to Europe, the rest of the North American land birds are for the most part restricted to that country, and two only out of the 62 Sylviadæ are found in Europe. Twenty-two species of Trochilus are described as natives of Mexico, but not one of the North American species has been met with in South America, although the family to which they belong is peculiarly characteristic of the ornithology of that country. In accounting for the causes which determined the migration of North American birds, Dr Richardson considered the spring movement intended for the purpose of finding suitable spots for breeding. The chief lines of route, he described as being mainly determined by the greater or less facility experienced in procuring food, from which circumstance the flights northwards and southwards often extended over very different lines of country. The physical structure of North America was also effective in determining three particular courses, along which these migrations occurred. The progress of civilization has already produced a decided effect in the migrations of some species, causing the starlings, for instance, to proceed further northward, as they are now secure of finding a provision in the corn-fields, where formerly they would have obtained no food. A table was then explained, in which were exhibited the total number of species hitherto known, with references to those which breed in Philadelphia, Massachusetts, and Suskatchewan. He considered America to afford remarkable facilities for tracing the course of the different tribes in their migrations, and concluded his report by a notice of certain *desiderata* to our knowledge of North American zoology, which will be printed apart in the forthcoming volume of the Reports of the Association.

Mr Rootsey exhibited a living specimen of a large spider, which had been accidentally imported in a freight of logwood from the Bay of Campeachy. He supposed it to be the *Aranea avicularia*, Linn. *Mygale avicularia* of modern authors. But Mr Hope expressed his opinion that it was not this insect, but a closely allied species described by Spix and Martius. He stated, however, that

he had seen the true *Mygale avicularia* alive in England, washed ashore from a wreck on the coast of Essex.

Mr Rootsey gave a detailed account of his experiments upon the root of Mangel-Wurtzel, made for the purpose of ascertaining the probability of its being successfully employed in this country for the manufacture of sugar. He exhibited specimens of this sugar of good quality, and considered that a judicious selection of the soil in which the mangel-wurtzel was to be grown might certainly render it an advantageous speculation. His opinion was founded upon the uses to which the refuse of this plant might be applied, after extracting of the juice from which the sugar had been obtained. Of this refuse an excellent kind of malt might be prepared, from which he had brewed good beer, and extracted an ardent spirit. It was also found serviceable for fattening cattle. He stated, contrary to the received opinion, that this plant was liable to the attacks of insects, as he had found it infested by the *Haltica nemorum*.

Mr G. Webb Hall, as a practical agriculturist, entirely differed from Mr Rootsey in supposing that the mangel-wurtzel might be grown to advantage for the purpose of making sugar.

Professor Henslow exhibited some crystals of white sugar-candy, obtained from the flowers of *Rhododendron Ponticum*. A detailed account of these has since appeared in Loudon's Magazine of Natural History for September 1836.

Mr G. Webb Hall read a paper "on the Acceleration of the Growth of Wheat." By a judicious selection of seed, and a proper choice of situation, Mr Hall had been able to procure a ripe crop in the middle of August from seed sown early in March. Dr Richardson referred to a remark of Humboldt, that the American crops generally were ripened in ninety days from the period when they were sown; and suggested the propriety of procuring seed from Hudson's Bay, where he had found the crop to ripen in seventy days.

A mode of accelerating the germination of seeds was noticed by Professor Henslow, who stated, that he had produced this effect by boiling the seeds of a Cape Acacia. The details of this experiment are given in Loudon's Magazine of Natural History for September 1836. Mr Hope referred to a custom in Spain of partially roasting the corn before sowing it, for the purpose of destroying an insect by which it was infested.

Dr Daubeny stated, that he had commenced a series of experiments for the purpose of ascertaining the effects produced by arsenic on vegetation. He had been informed that nothing but a few Leguminosæ would grow in a particular district of Cornwall, where the soil contained about 50 per cent. of the sulphuret of arsenic, and the rest of which was chiefly sulphuret of iron and silica. He had ascertained that a little of the sulphuret of arsenic produced no effect on vegetation, probably from its not being very soluble, though it was certainly taken up in a certain proportion. He had also ascertained that plants would bear being watered with a solution of arsenious acid, in much greater proportion than was hitherto considered possible, without injuring them.

Tuesday, August 23d.—Dr Richardson's Report continued.

Mr Bowman read a communication on the Longevity of the Yew Tree. He had examined several young trees whose precise ages were known, and had ascertained that their average rate of increase for the first 120 years was at least two lines, or the sixth of an inch per annum. He then proceeded to give his mode of estimating the ages of two very large trees, from the trunks of which he had

procured small fragments, for the purpose of ascertaining the rate at which they were now forming their layers. One of these is in the churchyard of Gresford, near Wrexham, North Wales. Its trunk is 22 feet in circumference at the base, and 29 feet just below its branches. It appeared from three sections that it had formed on the average $34\frac{2}{3}$ rings in one inch of the latest formed wood, and he concluded that this tree might be considered at 1419 years old.

The second tree is in the churchyard of Darley in the Dale, Derbyshire; and its mean diameter from measurements at four places is 1356 lines. From sections made on the north and south sides, he found that the new wood averaged 44 rings in an inch, and he concluded that this tree might be considered as 2006 years old. He accounted for these very old trees being met with in churchyards, by supposing them to have marked the sites of places consecrated to the dead, or devoted to some religious ceremony prior to the introduction of Christianity.

Professor Henslow differed from Mr Bowman, in his opinion that De Candolle's rule underrated the ages of these trees, and referred him to the reasons which he had already published in his Principles of Botany, for supposing that De Candolle's estimate made them at least one-third older than they really were.

Mr Ball exhibited some skulls of a species of Irish seal, which he considered to be hitherto undescribed as a native of Britain, and very distinct from the two already known. Whilst the *Phoca vitulina* was readily tameable, this species was never known to have been tamed.

Professor Nilsson of Lund immediately recognized these specimens as belonging to a distinct genus from *Phoca*, and which he had described by the name of *Haliochærus griseus*. It is common in the Baltic and North Sea, and occurs in Iceland, and when full-grown is eight feet long. He remarked that the *Phoca vitulina* of Linnæus contained three species, and one of these, not hitherto recorded as British (the *Ph. annellata*,) he had seen in the Bristol Institution, and which had been captured in the Severn.

Dr Riley exhibited the stomach of this last mentioned individual, in which he had found between thirty and forty pebbles, and stated it to be a vulgar notion that these were of service to the animal in some way, by enabling it to catch its prey with greater facility. Neither Sir Francis Mackenzie, Professor Nilsson, or Mr Ball, each of whom had frequently dissected seals, had ever noticed the occurrence of pebbles in their stomachs.

Dr Hancock described a new species of *Norantea*, which he had long considered to be identical with the *N. Guianensis*, but which he was now satisfied was distinct. Aublet's plant is described as a tree 80 feet high, but the present species is a large climber.

Mr Hope exhibited an hermaphrodite specimen of *Lucanus camælus* from North America, in which the right side of the head was formed with a projecting maxilla like the male, and the left with a contracted one like the female. A similar monstrosity has occurred in the European *Lucanus cervus*.

Mr Yarrell remarked, during a discussion which took place after the exhibition of this specimen, that he had found both male and female organs to be present on opposite sides of hermaphrodites among lobsters and birds which he had dissected; and he had met with a fish having hard roe on one side, and soft on the other. He then alluded to some singular facts which he had noticed in an hermaphrodite fowl, and which he proposed soon to make public.

Mr Hope read a paper "on the probability that certain Opinions of the Ancients were derived from their observations upon Insects," in which he particularly noticed the apparently spontaneous generation of many of these from the mud of the Nile, and the metamorphoses which others must have been observed to undergo. From hence he considered that they had derived their notions of the vivifying influence of the sun, and their doctrine of the metempsychosis.

Mr G. Webb Hall made some remarks upon the value of lime as a manure; and stated, that he had found by experience the advantage of employing it fresh from the kiln, and ploughing it into the ground within twelve hours of the time when it was first scattered over the surface.

Wednesday, 24th August.

Col. Sykes laid before the Section a manuscript volume containing an account of the fruits of the Deccan, which he had compiled during an extensive and minute statistical inquiry undertaken by him when in India. Most of the species enumerated were accompanied by accurately coloured drawings prepared by a draughtsman in his service, and each was furnished with a scale taken from actual measurement. His manuscript contained also the opinions of the Hindoos respecting the various medical and other properties of most of these fruits; and these he had compiled from five very ancient works obtained by him in the country, and written in Sanscrit. Col. Sykes then selected some of the more interesting species, both of the wild and cultivated fruits, upon which he commented, mentioning such peculiarities as he considered most worthy the attention of the Section. Of these, the golden plantain was remarkable for bearing fruit only once, and was a tree of great beauty. A plant, which he considered might be looked upon as the origin of the whole Citrus family, was abundant in a wild state over the western parts, and became a good sized tree. Near the source of the river Becara, he had found the wild nutmeg, also assuming the character of a large forest tree. A species of mulberry was noticed which he considered new. The Anona, Anacardium, and Carica are universally cultivated, though supposed to be natives of the new world.

Mr Mackay read a short report which he was requested last year to prepare, "on the Geographical Distribution of the Plants of Ireland." He enumerated such species as were common to the neighbourhood of Dublin, Edinburgh, and the south coast of Scotland, and selected 195 of the more remarkable species by which to illustrate his subject. The more southerly position of Ireland, and the comparatively lower elevation of its mountains, deprived this country of many species, chiefly alpine, which Scotland possessed, and of these Mr Mackay enumerated not less than 55. Many natives of the west coast are not found in Scotland, but belong equally to the mountains of Spain and Portugal. A list of 21 species was given of plants indigenous to Ireland, but not hitherto met with in any other part of Great Britain. Mr Mackay considered that he had not satisfactorily completed his researches on this subject, but proposed to give the Section an enlarged report on some future occasion.

Professor Royle then read a paper "on the Properties of Caoutchouc, and the various plants from which it was possible to obtain it." He had learnt from the proprietor of an extensive manufacture of this substance, that there were great difficulties in the way of obtaining it in a pure state, especially that which came from the East Indies, where Professor Royle knew that any quantity might be

obtained from a great variety of plants, if the natives could be prevailed upon to use the precautions requisite for procuring a superior article. The South American caoutchouc was much superior in value from this circumstance alone, since that from the east was of equally excellent quality. At present, that from Para sells at 2s. 6d. or 3s. per pound, whilst the East Indian fetches only 2d., and can be used merely for the purposes of distillation, in manufacturing the caoutchoucine. The material was now obtained, or could be obtained from many countries of the east, and by further research it would most likely be found to exist in several other species than those in the same families from which it was now procured. These families were stated to be Cichoraceæ, Lobeliaceæ, Apocynæ, Asclepiadæ, Euphorbiaceæ, Artocarpeæ. Professor Royle had remarked that bird-lime was often made from plants producing caoutchouc, and that these had their woody fibre particularly strong and tenacious. Coupling this fact with the circumstance of the silkworm feeding on the same or similar plants, he feels inclined to believe that caoutchouc may form an essential ingredient in their food. He had procured an analysis to be made of the juices of the mulberry, and found them to contain caoutchouc.

Mr P. Duncan proposed a query, which was not fully answered, whether the animalcules which produce the luminosity of the sea, ever emit their light under water, or without first coming to the surface?

Dr Hancock read a paper on a species of cow-fish closely allied to the *Manatus fluviatilis*, but which he considered to be distinct. He had noticed it in the interior of Guiana, but it is now rarely to be met with any where near the European colonists. The species grows nearly to the length of nine feet, and weighs about 800 lb. He thought this animal might be easily domesticated. Dr Riley thought it doubtful whether the animal described by Dr Hancock might not be a dugong; and noticed an error in Cuvier, who asserted the *Manatus Americanus* to have only thirty-two teeth, whereas he now exhibited a skull of this species in which thirty-six might be observed, or rather the places which they occupied; for it always happened that the anterior molars were shed when the posterior were being protruded. The places of two incisors were certainly to be found in the upper jaw, and probably there had also been two in the lower.

Dr Macartney explained his method of preserving animal and vegetable substances from the attacks of insects and other sources of decay. For this purpose he used a concentrated solution of equal parts of alum, nitre, and salt, mixed with an equal proportion of proof spirits of wine, to which a little essential oil, either rosemary or lavender, had been added. He recommended also the use of pyroligneous acid, and then a coat of plaster of Paris, which might afterwards be removed when the object was thoroughly dry.

A collection of beautifully preserved specimens of North American insects, procured by some persons in Bristol, was exhibited by Mr Hope. These insects were imported in casks of raw turpentine, and when this was dissolved, they floated to the surface, whence they were taken, and after being immersed in spirits of turpentine, to remove the turpentine with which they were encrusted, they were set out in the way which is usually pursued by entomologists.

Thursday, 25th August.—Dr Richardson's Report concluded.

A communication from Dr Moore, stated that he had taken the *Trigla cataphractes* in Plymouth harbour, and which was the first time this fish had occur-

red in Great Britain. Mr Carpenter read an abstract of Dr Pritchard's views contained in his "Physiology of Man," respecting the proper criterion upon which zoological and botanical species should be founded. He considered that science had now attained to that state in which it had become evident that a discrimination of species could not repose upon external characters alone, and ought to be coupled with certain characteristics, which could not be entirely obliterated or altered by the influence of external causes. He more particularly specified four heads, under which many circumstances might be arranged, as auxiliary means for the determination of specific differences. 1st, Such as regarded the several vital functions, because there were minute differences of structure which could only be understood to exist by observing a difference in the results produced by the same functions in different individuals. 2d, Hybridity. Dr Pritchard considered that true hybrids could only be rendered fertile by mixing with the parent breed. 3d, He thought it possible that pathological considerations might be employed, and instanced the operations of morbid poisons. 4th, The instincts, habits, and what might be called the psychical endowments of particular animals. The abstract given by Mr Carpenter was intended to promote a discussion on a subject already treated of by Dr Pritchard, and for which we may refer to his work.

Mr P. Duncan thought that instinct and habit were of great service in settling specific distinctions, and noticed particularly the difference in nidification between certain species of birds which very closely allied.

Mr Eyton mentioned having obtained fertile hybrids between a common gander and the *Anas cygnoides*. Also between the Chinese boar and a common pig. Mr Vigors was inclined to take Hunter's view of the non-fertility of true hybrids, and thought that many supposed exceptions had originated in a want of proper caution in performing the experiments. He thought with Dr Pritchard, that the diseases of different animals might be taken as one means of discriminating species, and he considered it possible to make use of the distinctions between the parasitic animals which infested them. Dr Riley differed from Dr Pritchard, and considered his views as too metaphysical, and thought it would one day be found necessary to abolish the notions of species altogether.

Mr Yarrell believed it to be nearly a universal law that hybrids were barren. It was unquestionably the case with the common mule, as had been often proved on the continent, where this animal was largely bred. But he mentioned an instance where fertile hybrids were produced between *Anas boschas* and *acuta*.

Rev. Mr Phelps read a paper "on the Formation of Peat," particularly describing some peat tracts south of the Mendip hills. So long as this tract had continued to be well drained, whilst it belonged to the abbots of Glastonbury, it afforded a very rich pasture land. After the monastery was suppressed, it became crown-land, and was neglected, and soon returned to the state of a peat bog. It had been subsequently reclaimed a second time, and Mr Phelps's researches had enabled him to find trees which had flourished during the period it was under the power of the abbots, and which had been imbedded in the subsequent formation of the peat; as well as many other objects of interest, and among these were some Roman remains which he had obtained at a depth of twelve feet.

Mr Mackay, after exhibiting some specimens of Scotch pine which he had procured from peat bogs in Ireland, proceeded to read a communication from Mr Nuttall "on the Management of the Pine Tribe," in which he stated having lopped some larches down to a strong lateral branch, and these had nevertheless be-

come fine trees ; and Mr Mackay noticed an instance of a similar kind, where some plants of *Pinus Canariensis*, which he had grown from seed, after being cut to the ground by a severe frost, had thrown up shoots from the stools.

Mr Forbes communicated the names and localities of sixteen species of shells new to Scotland, and had observed that many species, which on the east coast and in the Irish sea, were found only in very deep water, occurred above low water mark on the west coast.

Dr Lloyd read a paper on the *Marsiliaceæ*. He confined his observations more particularly to the *Pilularia globulifera*, and considered the two kinds of grains found in the involucre as respectively analogous to pollen and seed. In causing the seed to germinate he had observed that the first appearance of the leaf always took place at a determinate spot. There are no spiral vessels, but only a bundle of minute ducts in the centre of the stem and leaves.

An abstract of a paper by Mr P. Teale was read on the "*Alcyonella stagnorum*," and several specimens in beautiful preservation were exhibited. This animal was found near Leeds in 1835.

Mr Yates exhibited several specimens of the insect called a "vegetating wasp," which he had received from Jamaica. It appeared to be a *Polystrix*, according to Mr Hope, and to be incrustated by a remarkable fungus allied to *sphæria*, which, it was asserted, attached itself to the body of the living insect.

Dr Riley exhibited a skeleton of the two-toed ostrich, in which he pointed out the fact, hitherto unnoticed, of there being in reality a third toe in a rudimentary state, consisting of two phalanges, and articulated to a well-defined condyle. Mr Bowman exhibited a specimen of *Spiræa hypericæfolia* gathered near Denbigh, where it has become naturalized.

Dr Tyacke exhibited specimens of *Lamium intermedium* from near Edinburgh and several parts of the Hebrides.

Dr Corbet sent a communication illustrated with dried specimens and drawings, shewing the effects produced by causing plants to absorb first the prussiate of potash, and then the sulphuret of iron.—J. S. H.

NOTICES OF PROCEEDINGS OF SOCIETIES.—LONDON.

MEDICO-BOTANICAL SOCIETY, May 25, 1836. (Continued from p. 208.)—Dr Ryan in the Chair. A communication by Mr Alsop, on a new mode of making and preserving infusions, was read. The alteration in the mode of preparation consisted principally of a perforated plate inside the infusion jar, resting on a ledge, on which the material to be infused was placed. The boiling water is then poured on, and as it becomes saturated, sinks through the perforations, fresh liquid supplying its place, as long as there is any thing left which water can dissolve. It is to be preserved by bottling it hot in well-stoppered vessels, filled completely, so as entirely to exclude the atmospheric air. In this way, Mr Alsop preserved an infusion for nine months.

A paper by Colonel Galindo, the envoy from Guatemala, was next read, giving a list of the medicinal plants of that country. After which Mr Foote read an essay on the use of the oil of turpentine in the treatment of inflammation of the iris. In accordance with the views of Mr H. Carmichael of Dublin, he recommends its employment in those cases only, where, from previous free use of mercury, or from idiosyncrasy, that powerful remedial agent cannot be had recourse to. Several cases were detailed in proof of its efficacy. Mr Foote con-

siders it acts as a counter-irritant on the alimentary canal.—*Communicated by Mr Foote, one of the Secretaries.*

PROVINCIAL.

TWEEDSIDE PHYSICAL AND ANTIQUARIAN SOCIETY.—This society, established at Kelso in the year 1834, has for its principal object the study of the natural history and antiquities of the district traversed by the Tweed and its tributary streams. The members are engaged in establishing a museum, in which are to be preserved specimens illustrative of those branches of science; all expenditure of the society's funds being restricted to such objects as belong to the locality to which its attention is chiefly directed, though the reception of *donations* of other specimens and curiosities generally is not considered as excluded by the society's plan. Among its present acquisitions is a Herbarium, containing by far the greater portion of the plants occurring in the district, and upon which was founded the Berwick Flora of Dr Johnston; besides a collection of upwards of 400 specimens of grasses and other plants, distinguished for their economical uses or their connection with agriculture. The collection of native birds, which is daily on the increase, amounts at present to about 200 in number, and includes several which are rarely met with in the locality, such as the *Falco peregrinus*, *F. æsalon*, *Caprimulgus Europeanus*, *Lanius excubitor*, *Bombycilla garrula*, *Loxia curvirostra*, *Picus major*, *Anas glacialis*, *A. ferina*, *A. acuta*, *Anser bernicla*, *Mergus albellus*, &c. Some of the most interesting of the native quadrupeds have been preserved, and there is a small collection of shells, with a moderately extensive one of minerals and fossils. The museum also possesses a few valuable books relating to the sciences, the study of which it is intended to promote; the nucleus of a collection of British coins; and various curiosities and antiquities, both general and local. It is supported chiefly by donations, and by a small annual subscription of 10s. 6d. from each member. The members are 84 in number, and may be classed as follows: nobility and gentry, 33; clerical, 8; medical, 8; legal, 8; mercantile and agricultural, 27. Sir Thomas Makdougall Brisbane of Makerstoun, K. C. B., &c. is the president for the current year. The general meetings take place once a quarter, at which essays and communications are received and read; and the museum is open for gratuitous inspection thrice a week. A new building will probably be provided at no distant period, to be specially appropriated to the purposes of the society, a portion of the requisite funds having already been contributed.—His Grace the Duke of Roxburghe has been engaged for two or three years past, in the formation of a collection of British birds at his seat of Fleurs, Roxburghshire. The specimens, male and female, amount at present to nearly 400 in number, and include some of considerable rarity, either as residents or as regular or occasional visitants. Amongst them are (*Accipitres*) *Strix bubo*, *S. scops*, *S. nyctea*, *S. passerina*, *Falco Islandicus*, *Pernis apivorus*, &c.; (*Rassores*) *Cypselus alpinus*, *Pastor roseus*, *Oriolus galbula*, *Upupa epops*, *Merops apiaster*; (*Scansores*) *Picus martius*, *Yunx torquilla*, *Nucifraga caryocatactes*, *Coracias garrula*; (*Grallæ*) *Ardea egretta*, *A. nycticorax*, *A. minuta*, *Recurvirostra avocetta*, *Ibis falcinellus*, *Tringa pugnax*, *Oidienemus crepitans*, *Otis tarda*, *Himantopus melanopterus*, *Scolopax major*; (*Palmipedes*) *Anas spectabilis*, *Cygnus ferus*, *Colymbus glacialis*, (killed near Fleurs,) *Anser erythropus*, &c. The museum is tastefully and judiciously fitted

up, and the specimens are of the most perfect plumage, and in excellent preservation.

NATURAL HISTORY SOCIETY, BELFAST—The eighth public meeting of the Society was held in the museum on the 25th May, when the annual report of the council was read. The prospects of this Society are advancing; a debt of L. 800, with which it has been encumbered, has been nearly cleared off. The number of members are increasing, and considerable additions have been made during the past year to the museum and library. The zoological and botanical papers during the last session read were, “On the various contrivances for diffusing seeds observable in cryptogamic plants,” by the president—“On the insects mentioned in Shakspeare’s Plays,” by Mr Paterson;—“On some proofs of design observable in the animal kingdom,” by Dr. Thomas Henry Purdon. The season was closed by an address from Mr James M’Adam reviewing the recent progress of science in Belfast.—The officers and council for the ensuing year, are James L. Drummond, M. D. President—Rev. Dr Hincks, M. R. I. A. Hon. V.-P. William Thomson, } V.-Presidents. Jas. M’Adam, Corresponding Secretary.
George C. Hyndman, } John Grattan, Librarian.

R. S. M. Adam, } Recording Secretaries. William Web, Treasurer.
J. D. Marshall, M. D. }

Thomas Andrews, M. D.

William Patterson.

James Bryce, Jun. A. M. F. G. S.

James Sanders, M. D.

Edmund Getty.

Rev. Isaiah Steen.

Robert Patterson.

Professor Stevelly.

OBITUARY.

We announce with much regret the death of Mr Edward Turner Bennet, Secretary to the Zoological Society, who died on Sunday, 21st August, after a short illness. By his decease the Society has lost one of its most efficient office-bearers, and one whose province it was to detail the interesting additions which were acquired to the Mammalia of the collection. In this department he ranked deservedly high; perhaps, so far as Britain is concerned, higher than any one. This will be borne out by the papers he has published in the Transactions of the Zoological Society,—a work, of which he took the principal superintendence, and which for general execution, stands unrivalled. He is also known as the author of the Tower Menagerie, and the Gardens and Menagerie of the Zoological Society. His name will stand recorded by the *Antelope Bennetii*, *Orthotomus Bennetii*, &c. &c.